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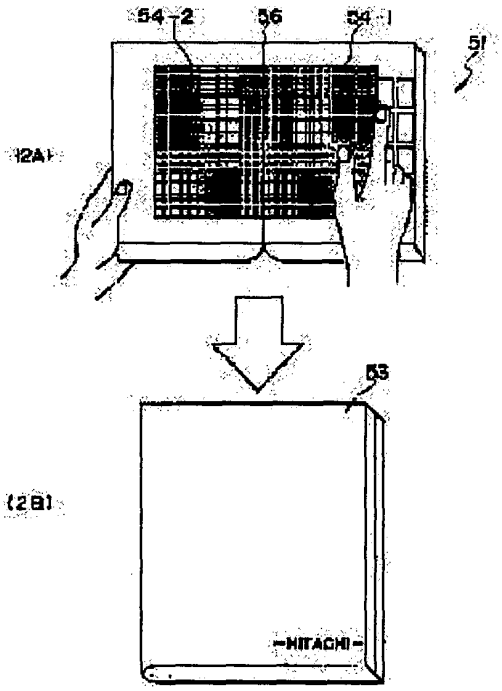
(54) PICTURE DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To display pictures corresponding to the double spread display of a book by providing a first display part and a second display part and making display parts to be a form near to the spread display of the book while making two display parts to be freely openable and closable at a coupling part.

SOLUTION: Display areas of two sheets of liquid crystal displays (LCDs) 54-1, 54-2 are made to be the same sizes. Moreover, a control panel is provided at the upper right of a frame. Further, the panel may be provided at upper left and right parts of the frame. Furthermore, the frame is folded into two parts by providing a coupling part (a hinge) 56 at the center part of the frame. This device is carried in a state in which the frame is folded in such a manner. Then, the display data from a recording medium are made to be displayed on display screens in laterally long displayings and the data are displayed in longitudinally long displayings by rotating displayed data by 90 degrees. Thus, displays are performed in accordance with the double spread of the book and pictures are made to be displayed on the LCD screens in various systems such as laterally long displaying or longitudinally long displaying, independent one screen displaying or two screen integration displaying according to the kinds of books and display data.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] Image display equipment which each screen is made to indicate the indicative data from a record medium by oblong, and is characterized by rotating the indicative data 90 degrees and indicating by longwise in the image display equipment possessing the main part which has a display equipped with the first screen, and a display equipped with the second screen, and the bond part which combines the two aforementioned displays with one.
[Claim 2] While using each screen of two displays independently, the first screen can be indicated by longwise and the second display screen can be replaced with an oblong display, and it is the image display equipment according to claim 1 which widens the first screen and also enabled it to make the second screen longwise conversely.
[Claim 3] Image display equipment according to claim 1 or 2 is made to rotate 90 degrees from an oblong display, and it enabled it to change to a longwise display while using the first screen and second screen as the one connected screen in all.
[Claim 4] Image display equipment according to claim 1 to 3 characterized by making it the first screen and second screen start simultaneously when a power supply is switched on.
[Claim 5] Image display equipment with the starting power supply which the first screen and second screen became independent of, respectively according to claim 1 to 4.
[Claim 6] Only the first display can be started, the second display cannot be started and it is the image display equipment according to claim 1 to 5 make start the second display conversely and prevented from making start the first display.
[Claim 7] Image display equipment according to claim 1 to 6 which makes a standard gestalt A 4th edition 400dpi length length as a data format of a display.
[Claim 8] Image display equipment according to claim 1 to 7 which contains 1 page of display pages in the data format of a display.
[Claim 9] Image display equipment according to claim 1 to 7 which contains 2 pages of display pages in the data format of a display.
[Claim 10] Image display equipment according to claim 1 to 7 which contains 4 pages of display pages in the data format of a display.
[Claim 11] Image display equipment according to claim 1 to 10 which makes longwise criteria the display page in the data format of a display.
[Claim 12] Image display equipment according to claim 1 to 11 which was made to display by expanding the data currently displayed on the screen of the first display to the screen of the second display in the image display equipment possessing the main part which has a display equipped with the first screen, and a display equipped with the second screen, and the bond part which combines the two aforementioned displays with one.
[Claim 13] Image display equipment according to claim 1 to 12 which established the reference point which expands each display screen in the corner of a screen.
[Claim 14] Image display equipment according to claim 1 to 13 formed so that a screen might be divided into nine for the reference point which expands each display screen and the whole screen might be covered.
[Claim 15] It is image display equipment according to claim 1 to 14 formed so that the reference point which expands the display screen might be divided into nine for the whole screen and the whole screen might be covered, when making the two display screens into the one connected display screen.
[Claim 16] It is image display equipment according to claim 1 to 15 formed so that the reference point which expands the display screen might be divided into 18 for the whole screen and the whole screen might be covered, when making the two display screens into the one connected display screen.
[Claim 17] Image display equipment according to claim 1 to 16 to which choose one of the display screens of the

display screen currently displayed as, and it also enabled it to expand only one of the two's screen.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention is carried type image display equipment replaced with printed matter, such as a book, has the same spread display and same portability as a book, and relates to the image display equipment which displays electronic space information.
[0002]
[Description of the Prior Art] Although the thing of a method which already used the liquid crystal display (LCD) is produced commercially about the book-mold display at the present stage, neither has played the role which can be replaced with books in respect of resolution. It is because the limitation in the present LCD technology is in sight. However, it is thought optimal to use LCD in order to realize the image display equipment using the existing display method.
[0003] About CRT which is TV monitor which has spread general most first, the Hi-Vision which is a highly minute display is raised. However, aiming at highly-minute-izing, enlargement of CRT is a prerequisite, and the miniaturization of equipment is difficult. Desired value is not fulfilled with VGA adopted as an existing standard display at the point of resolution although LCD can be satisfied in respect of a miniaturization. Moreover, SVGA which has gone up as further high resolving display recently is also the point still technically in respect of [with high resolution cleared] the miniaturization of a display, although resolution approached the level.
[0004] Then, several means of displaying using LCD which is indicated by JP,6-138839,A, JP,3-217959,A, and JP,4-355786,A have been considered. The image display equipment indicated by JP,6-138839,A is the size of a paperback or pocketbook book size, and the liquid crystal display with which this equipment is equipped is a size below A6 seal size, it equips a two-sheet spread with a liquid crystal display, and shows only the character as an indicative data. It is image display equipment which equips this soma of the size of A4 seal note spread with the sheet-like liquid crystal display, and substitutes image display equipment given in JP,3-217959,A for a key stroke with an input tablet. . Moreover, in JP,4-355786,A, it is the display filed by one side like the page of a book in piles in two or more liquid crystal displays, and is displaying by one sheet being independent and each using a liquid crystal display.
[0005]
[Problem(s) to be Solved by the Invention] Generally, by printing media called a book, in order to have resolution to the extent that it can recognize to a very fine character and to actually express books information, such as comics, in an image, resolution equivalent to the 24-dot angle per single character of the existing standard printer is needed. Moreover, if it expresses on the 24-dot square per character, as a 3mm angle, the size of a single character serves as resolution of about 8 dot [/mm] =about 203 dpi (dot per inch), and can satisfy books information. However, although it is not enough in respect of the conspicuousness of the screen, and resolution as display replaced with a book compared with printing media, such as a book, when using LCD (liquid crystal display) etc. as a display, with the existing technology of LCD, difficulty cannot be denied with manufacture, mounting technology, etc.
[0006] this invention is a thing which also has the portability which is a property which compensates the above-mentioned trouble, and does not spoil the information acquired from printing media called a book, but a book has and which opens wide and offers the book-mold display of a display.
[0006]
[Objects of the Invention] As a flow of a personal digital assistant, the personal information terminal of small and a new genre which is recently different from the existing terminal although it was the purpose which it turns and can be used also in a going-out place or movement lightweight is appearing deferred type a personal computer/word processor at first. Although these have main personal-data processing of the address, schedule management, etc., the exclusive terminal which targeted electronic publishing in part also exists.

[0007] In this example, the function and portability same as a display terminal machine as a "book" which display the electronic publishing which is the media replaced with this "paper" are given, and it aims at offer of the book-mold display realized as a personal information terminal replaced with a book in the future.
[0008]
[Means for Solving the Problem] The image display equipment of this invention is image display equipment which was equipped with the first display and second display, enabled opening and closing of two displays by the bond part, and was made into the gestalt near the book of a spread display. The image display equipment of this invention prepares LCD in the screen of each display, makes the screen of the first display, and the screen of the second display close to a bond part, and arranges it, two LCD screens can be used, considering that they are one screen, or each screen can also be used for it as one independent screen.
[0009] In the image display equipment of this invention, when using two LCD screens as one independent screen, it is possible to indicate by longwise, or to make it rotate 90 degrees, and to indicate the content of an indicative data by oblong. When using two LCD as one connected screen [one] in all similarly, it is possible to consider as a longwise display or an oblong display. furthermore, one of two LCD -- a stroke -- only a field is used, and the remaining LCD screens cannot be used, either, carrying out power supply OFF
[0010]
[Function] According to the image display equipment of this invention, corresponding to the spread display of a book, a display is possible by having two LCD of the latus screen, and a picture can be displayed for a LCD screen by the kind and indicative data of a book by various methods, such as an oblong display, a longwise display, a 1 screen independent display, or a 2 screen one apparatus display. From this, since the display united with the indicative data can be performed, a user becomes possible [reading by one's favorite legible means of displaying], compensates the resolution of LCD, and can also perform a lot of data display, such as a magazine.
[0011] Therefore, it is the display which could use it that there is no sense of incongruity as display replaced with a book, could display that electronic media information by the **** volume, and has the same display function as a book.
[0012]
[Example] Hereafter, the book-mold display of this invention is explained.
[0013] (System outline) The electronic space information distribution system made into the background of this invention is explained first.
[0014] Change to an electronic space information distribution system at the printed matter (space information, such as newspaper and magazine) use in the conventional paper, and space information is changed into an electronic intelligence. It distributes and sells at the vending machine installed in the station etc. a consumer The electronic space information is purchased by recording on electronic recording media, such as an IC card and a magneto-optic disk. It is the system included from the information production and circulation for using by displaying with personal digital assistants, such as a carried type display, to consumption, and is the system which realizes the so-called paperless-ized society.
[0015] By this electronic space information distribution system, the consumer of individual level can be provided with information as "electronic media" replaced with paper. Moreover, the saturation level of this system not only becomes high, but it is expected by using a book-mold display as a display terminal that a large-scale new commercial scene is born. If it becomes the media replaced with paper, this system is used on each home or individual level, spread progresses at an increasing tempo, it develops further and the commercial scene has possibility that a personal digital assistant may become a big commercial scene of "one person [one]." Moreover, by the spread of vending machines, electronic space information can be easily purchased now in a stand, a street, etc. of a station, and required information can be acquired anywhere. As information included separately, all the alphabetic information of not only a newspaper but a book, a magazine, etc. can be acquired now.
[0016] Hereafter, this system configuration outline is explained using drawing 1 . This system consists of three subsystems of another ****, the production system 1, flow system 3, and the consumption system 5 greatly. The production system 1 consists of a publishing business company 10 and an electronic space information manufacture contractor 20, and is further constituted from a newspaper publishing company 11, a publishing company 13, and a small-scale publishing company 15 by the publishing business company 10.
[0017] By the small-scale publishing company 15, the publishing business company 10 and the electronic space information manufacture contractor 20 do not specialize, but there is an electronic space-ized system 25 which carries out the same work as the electronic space information manufacture contractor 20 to the interior of the small-scale publishing company 15.
[0018] Flow system 3 consists of the electronic space distribution of information and a vendor 21, and a broker 30. The

electronic space distribution of information and a vendor 30 consist of a center 32 and a vending machine 40. A center 32 consists of the receiving system 33, a record / edit system 34, a transmitting system 35, and a managerial system 36.

[0019] The consumption system 3 consists of personal digital assistants 51 which they have with the general consumers 50, such as commutation and an attending-school person.
[0020] From a newspaper publishing company 11, the newspaper side information 12 is offered and the magazine space information 14 is offered from a publishing company 13. From the small-scale publishing company 15, an electronic advertisement and town news 26 are offered.
[0021] It can connect by the ISDN circuit 28 and the electronic space manufacturers 21 and 23 and a center 32 may connect the small-scale publishing company 15 and a center 32 with a dial-up line 29.
[0022] In this system, the electronic space information manufacturer 20 changes into the electronic newspaper space 22 and the electronic magazine space 24 as electronic space information on the convention format of this system first. Moreover, it is changed into an electronic advertisement and town news 26 also by the small-scale publishing company 15 by the electronic space-ized system 25 which it has in the interior. And these are distributed and sold to a vending machine 40 from a center 32. Here, it considers per [target] data capacity.
[0023] (Analysis of an indicative data) Greatly, by dividing into two, the information which the newspaper and books as an example of the space data to treat have is found out, and consists of "character" information, such as this report and an advertising report, and "picture" information, such as a photograph and a chart. However, if space information is treated as graphical data, the whole can be expressed as an image. By carrying out like this, the same data treatment as an image scanner or facsimile can be performed. The amount of data when treating space information as an image is shown in Table 1.
[0024]
[Table 1]

用紙サイズ	解像度(dpi)	水平×垂直ドット数（ドット）	情報量 (MByte)
A4	400	3,232×4,736	1.9
A2	200	3,232×4,736	1.9
A4	200	1,616×2,368	0.5

表1 イメージ化した紙面情報

[0025] In order to express in an image information, such as comics contained in books, you also have to carry out expression so that alphabetic information, such as not only fine image information but blowdown, may not be spoiled. However, for expressing the character of the blowdown, resolution equivalent to the 24-dot angle of a standard printer is required per character. If it expresses on the 24-dot square per character, the size of one character will serve as resolution of about 8 dot [/mm] =about 203 dpi (dot per inch) as a 3mm angle, and this is the level with which can be satisfied of image information. Moreover, the amount of indicative datas in the case of filling the resolution of this level is very large, and serves as data (about 0.5MB) of 2,368 dots of level 1,616-dot x perpendiculars on the page 1 of A4 seal.
[0026] (Requirements to display) The following two points can be considered as requirements to display.
[0027] Resolution (1) : although the protomerite described that the resolution of A4 seal 200dpi is required also at the lowest in order to have displayed space information, such as a newspaper and comics Since it is assumed as display to be replaced with books in the future, a book-mold display does not have that the content of a display of display [like the case where a reader reads a book /, over both sides / the page 1 of space] also increases upwards, and it is reading a book, and sense of incongruity, and can be used. Furthermore, the resolution of 300dpi to a maximum of 400 dpi is required for the kanji's shaking and making it recognize to the Japanese syllabary.
[0028] Moreover, it is necessary to display on a magazine etc. marginal alphabetic information, such as the **** broth column which can be seen well. In order to see these fine information, human being's eyes repeat expansion and reduction and are performing them to the inside of unconscious. The function which simulates operation of these human beings is made to add to display, and it is necessary to make it transmit space information to a reader.
[0029] Although it is necessary to have the capacity which can be displayed in the resolution corresponding to space 1

**-JI stated for the protomerite in order to transmit space information to a reader with display, even if it cannot display 1 page of the whole, in order to expand the portion which a screen wishes at least or to grasp the whole space, the capacity which can raise resolution by reducing and displaying in false will be required. Because, if human being may overlook the whole space and a header report may be read when reading a newspaper, moreover, he will repeat at random operation of reading one report of the very narrow range in an instant. For this reason, it is required for it to be possible to perform enlarging or contracting, scrolling, and page selection, and to read the space of monochrome binary dot data at least. Although a "picture" can be recognized if the case where comics are displayed is taken for an example as an example which shows the resolution of LCD of 640x480 dots of this resolution, reading is difficult for the "words" of the blowdown. In order to read the "words" of the blowdown, after incorporating the picture information on comics, it is raised that the center system of transposing only alphabetic information to legible characters (for example, character in which the about 12-dot angle per character was standardized), and reediting it also with a low resolution also needs to be built. Although it is possible to recognize a "character" by this editing task, the rating of the side which manufactures electronic space information is made increased to making it always display by doing this work.

[0030] (2) Portability : it is necessary as a following demand item to give portability, such as a newspaper and comics, and simple nature to display. In general books, "the handiness which can be read anywhere" is a natural thing, and it is necessary to solve this natural property by lightweight[a miniaturization and]-izing display. It is always portable anywhere, and also in narrow space, it is usable, and while actually using it, it is necessary as an alternative of books to be able to satisfy the point that a weight is not worrisome.

[0031] as the acquisition gestalt of this data (electronic space information) -- a station, a street, etc. -- a stand -- for example, it is more nearly required than the electronic space information vending machine which sells this data for the newspaper for one volume and the information on a magazine to be able to come to hand with record media (IC memory card etc.), and to be able to record this on the magneto-optic disk which is a nonvolatile mass record medium IC memory card also carries out attaching a battery etc., and will have the need of not volatilizing (assuming that it is recordable on a magneto-optic disk etc. in the meantime) on the 1st or more. Moreover, the information recorded on the magneto-optic disk can be chosen and pulled out by ******, and the selection for it and a display function are also required for it. This function is a search function to appear one by one [the newspaper currently recorded as pushing a certain button, for example, and a magazine] the 1st page. The information on several ten newspapers and magazines is recordable on this one magneto-optic disk. However, since it cannot record any more when capacity is full, it is a search function, and if a certain newspaper and a magazine are pulled out and an elimination button is pushed in the state, the ** also needs elimination functions, such as disappearing. However, the elimination button must be devised so that it may not be pushed suddenly. The book-mold display based on the demand of (1) of a more than and (2) was made into this example.

[0032] (Appearance, basic composition) The external view of the book-mold display 51 is shown in drawing 2 . In addition, as an option, it consists of a battery charger, an optical MAG disk driver (a ** cable, magneto-optic disk), a dry cell box, etc. Since this equipment assumes the display terminal replaced with a book, appearance is specification equivalent to a book, is opened, and the screen is in both sides and it is constituted, using LCD (liquid crystal display) 54 two sheets. This image display equipment 51 is carrying out a configuration which it is at the use and pocket time and is different, and it has become the spread monitor which equipped right and left with LCD54 the same with reading a "book" at the time of use. Moreover, at the time of carrying, the spread state at the time of use is used as 2 chip boxes in the center, and it carries it in the size of the half at the time of use. The third page view of a general view of the book-mold display using STN formal reflection type LCD is shown in drawing 3 . Moreover, the third page view of a general view at the time of it being close and using LCD54 of the TFT form which can be arranged as other examples, is shown in drawing 4 .

[0033] Each is set to LCD1 and LCD2 for LCD54 of two sheets. A screen product on either side is made into the same size. A control panel is formed in the upper right of a frame 55. Moreover, you may form a control panel in the right-and-left upper part of a frame 55. A bond part (ginglymus) 56 is formed in the center section of the frame 55, and as shown in drawing 2 B, it bends to two in right in the middle. It carries in this state where it bent.

[0034] The basic composition of the book-mold display 51 is shown in drawing 5 . Let this display 51 be equipment which is equipped with two LCD (liquid crystal display)54 of 640x480 dots of resolution, and is equipped with 80% or more of screen product to the whole display 51. The size of LCD54 is A5 size, is doubled two sheets and enables it to display A4 size. In this example, STN formal reflection type liquid crystal is used for LCD54. As shown in drawing 6 a, there is a magnifying lens 58 corresponding to each of LCD54, and it supports by the anchoring section (lens starting mechanism) 59 supporting this lens. The size of a magnifying lens 58 is [whether it is equivalent to the size of LCD54, and] a size beyond it. the time of a magnifying lens 58 maintaining fixed distance above LCD54, and being put on it, where display 51 is opened, and bending equipment -- a magnifying lens 58 -- LCD54 -- it is alike, respectively, it

sticks, it becomes depressed so that it may become even about an equipment front face, and it is equipped into 581
[0035] The purpose of this magnifying lens 58 is losing on optics the frame portion 55 between two LCD54 (portion which does not carry out image display), and is filling the gap between LCD screens and making it one connected screen. For this reason, the edge of the display screen of LCD is brought near by expanding an image display portion.
[0036] When a magnifying lens 58 (the Fresnel lens was used in this example) opens equipment by the anchoring section 59, it comes floating with a certain gap to each field of LCD54, and the magnifying lens 58 on either side has become the structure which becomes the position where it is made to run against an inside edge mutually in, and it lost the gap of both lenses.
[0037] About this mechanism, as shown in drawing 5 and 6, it carries out by the movement of the hoop direction of the anchoring section 59 attached to the edge of a magnifying lens 58. By this, a magnifying lens 58 is stuck to each field of LCD54, when this equipment is folded up. Moreover, when this equipment is opened, by moving the anchoring section 59 to the combination side of equipment by the hoop direction, a magnifying lens 58 is floated from each field of LCD54, and both lenses are brought near. People perform this operation by hand. this -- the magnifying lens 58 of two sheets -- LCD54 of two sheets -- without it carries out screen expansion, stuck to each field -- LCD54 -- a screen can also be seen independently Moreover, by preparing a spring in the anchoring section 59, when this equipment is opened, it can constitute so that it may attach automatically and the section 59 may be moved to a hoop direction, and it is also possible to consider as the composition in which a magnifying lens 58 is floated.
[0038] Work of a magnifying lens 58 is further explained using drawing 7 . As shown in drawing 6 a, a magnifying lens 58 is arranged so that the optical axis 582 of both lenses may be located in the center section of the field edge of each edge of the direction of a spread of the field which displays the screen of LCD54. The optical view of the above-mentioned arrangement of relations, such as the focal distance f of a lens, to drawing 7 a is shown in the distance b row of the magnifying lens 58 of two sheets, and LCD54 of two sheets at drawing 7 b.
[0039] Here, these relations are expressed with following the (1) formula, when distance of LCD54 and a magnifying lens 58 is set to b, distance of a magnifying lens 58 and the virtual image 541 of LCD is set to a and the focal distance of a magnifying lens 58 is set to f.
[0040] $1/(b)-(1/a) =1/f$ -- (1)
[0044] And when the length of LCD54 is set to L and the length of the virtual image 541 of LCD54 is made into L', the relation between Distance a and b and length L and L' is expressed with following the (2) formula.
[0041] $L/L'=b/a$ -- (2)
[0042] Here, on condition that LCD 54-1 on either side, the virtual image 54-1 of 54-2, and the edge of 54-2 contact, the combination of the distance a between the focal distance f of a magnifying lens 58, a magnifying lens 58, and LCD54 is selected. In this condition, if distance deltaL (this serves as half [of the distance between two LCD]) of a bond part and a LCD edge is used, the relation of L, L', and deltaL is shown by following the (3) formula.
[0043] $deltaL=L'-L$ -- (3)
[0044] Here, although equipment may become thin so that Distance b is small, a focal distance f becomes small. The lens of a short focal distance is needed with the diameter of macrostomia, and this requires a limit from a variation etc.
[0045] Therefore, as for a magnifying lens, it is necessary for Above delta L and L, and b and f to fill the relation of following the (4) formula.
[0046]
$L/(L+deltaL) =1 -(b/f)$-- (4)
[0047] Thus, expansion of a screen is performed only by going in the direction of the bond part 5 of equipment. The advantage of this method can make a dilation ratio small, and the distance between LCD and a lens is also small and it is with a bird clapper.
[0048] Next, arrangement of the structure of equipment and the parts in equipment is explained using drawing 8 . The bond part 56 is a ginglymus and lets wiring to each LCD54 etc. pass. It is necessary to arrange all parts from a portable point to the equipment 51 interior on a book-mold display. Therefore, a power supply, arrangement of a base, etc. are determined. First, in a power supply, this equipment shall equip 14 cells 517 of 1.2V by calculation of the power consumption in the whole equipment. It distributes to the equipment of right and left of the number of cells 517 equally from this. Moreover, when equipment is opened, part arrangement of the whole equipment is determined that the weight distribution of right and left and the upper and lower sides will be equal. In this example, a memory card socket is large in weight, and arranges in a case mainly in consideration of these a cell 517, the electronic-circuitry substrate 511, the driver 522 for record media, and here. Furthermore, the SCSI connector 518 as the interface section with an external instrument is carried in equipment 51.
[0049] DICEP513, PLD514, DRAM515, and VRAM516 are carried in the electronic-circuitry base 511 with the SH microcomputer 512 mentioned later. Although a book-mold display unit size is decided by the size of LCD54, the size

of a monitor and the size of the whole equipment need to be miniaturized as much as possible in the size of other portions so that only a control-panel portion may become large.

[0050] (The image display method) In order to mainly perform image display, it displays by the image data. First, the image data compressed from the electronic-intelligence vending machine 40 of a distribution system is obtained in a record medium 52. Next, a record medium 52 is inserted in a book-mold display, the data for the LCD display screen in a record medium 52 are elongated, and it transmits to memory 515. Display screen data of 4,736 dots of level 3,232-dot x perpendiculars equivalent to A4 seal 400dpi with high resolution are saved on memory (DRAM) 515, and a data transfer is performed according to the display to LCD54. For example, when the display screen of LCD54 is made into 640x480 dots of A5 sizes, resolution is 85dpi, and resolution is 60dpi when the screen of A4 size is constituted from two LCD of A5 size. Since the resolution which LCD54 has is this value, it performs expansion of a screen, and reduction and displays image information to the fineness for data of a maximum of 400 dpi. The whole cannot be displayed at this time (at the time of expansion).

[0051] From memory (DRAM) 515, expansion or reduction holds data in the memory (VRAM) 516 which stores the data only for direct or the display corresponding to [thin out and extract and] each LCD54, and displays it. In the directly other screen reduction in the above-mentioned finest display, by infanticide, a screen is made coarse and the screen is indicated, for example by the whole in 640x480 dots. the case where data of 4,736 dots of level 3,232-dot x perpendiculars equivalent to A4 seal 400dpi are thinned out and used -- a level perpendicular -- one eighth -- thinning out (one being displayed on 8 dots) -- it becomes 592 dots of level 404-dot x perpendiculars, and 640x480 dots goes into one screen At this time, the state where the dilation ratio was reduced most is possible up to 8 times noting that it displays 1 page of A4 seals on one LCD. moreover -- a level perpendicular -- one fourth -- thinning out (one being displayed on 4 dots) -- it becomes 1184 dots of level 808-dot x perpendiculars, and goes into a 2 screen 640x (480x2) dot mostly At this time, the state where the dilation ratio was reduced most is possible up to 4 times as displaying A4 / 1 page on two LCD mostly (the applied portion moving a screen vertically and horizontally, and corresponding).

[0052] Although what was described above is an example, the accumulated dose to the memory (VRAM) 516 of the data corresponding to a dilation ratio and this is determined in this way. When expanding, it is necessary to prepare the place which becomes criteria, such as expanding centering on the point of a display with the display screen, for example, a center. Since what is necessary is just to add the surroundings of it to a display centering on the displayed screen when reducing a screen, it is not necessary to prepare especially a reference point. Expansion and reduction also need to change a setup of a reference point in both in order to make it possible in both the case where two sheets are independent and LCD is used, and the case of using it as one screen by two sheets. When two sheets are independent and LCD is used, after choosing [of LCD 54-1 and LCD 54-2] which is expanded, respectively, it is performed. Moreover, it expands, after choosing whether the reference point to expand is made into one of on either side, when using LCD of two sheets as one screen. In this example, although the reference point of expansion is the center of a picture, a corner on all sides is sufficient and a reference point is established in one on a screen. When the portion of the blank paper with which data are always displayed on the display screen centering on a screen, and data are not displayed comes out, the center of a picture is surely on the display screen, and it is made for the portion as which data are not displayed on all sides to come out.

[0053] (Screen color) The monochrome display was used for two LCD in this example. Since there are some for which the direction of a color display is suitable depending on the content of an indicative data, a color display is used in other examples. moreover, one side of two screens -- monochrome -- you may already make one of the two into a color Anyway, cost etc. is taken into consideration and a display is chosen.

[0054] (Picture data format) The picture data format of the record intermediation inside of the body used with this display is explained below. First, image data is contained in the record medium with the data-hierarchy form of a title classification of the whole book, a content classification, and each actual page space.

[0055] The data of space were compressed and are contained. As this example, the compression method has adopted the MMR method. And after elongating the data included in the record medium, the data for 1 page of A4 seal 400dpi are transmitted to memory (DRAM) 515. Although the specification of this A4 seal 400dpi is decided by this example from a space data distribution system, a system is able to opt for the format of data in accordance with the resolution and specification of display of a low resolution by the improvement in the resolution of future LCD, or small [other], and to unite with it. Moreover, although the data format of A4 **** is made into specification in this example, contrary to this, a horizontal format is sufficient. Although considered as A4 seal 400dpi, and 1-page 2 M bytes, if it considers as the display which develops the capacity for 2 pages on memory as a capacity of memory (DRAM) 515, it corresponds by increasing to 4 M bytes. Moreover, if the resolution of a data format is lowered even to A4 seal 200dpi of for example, the FAX average, the data for 4 pages can be held, without increasing capacity from 2 M bytes. this -- A of this example -- it is the same as what the content for 4 pages of stencil paper is put into one page for (for example,

the page 4 of A4 seal is arranged in in all directions [2x2], and it reduces, and considers as the page 1 of A4 seal, and this is processed electronically by the data format of 400dpi) from the first to a longwise data format 400 dpi 4 seal
[0056] Moreover, when treating the data for the page 2 of A5 seal as this middle so that it may state below, it thinks. this display -- LCD 54-1 and LCD 54-2 -- independently, since it is also possible to display by doubling, corresponding to each LCD, the data (A5) of stencil paper are divided and displayed, respectively At this time, A5 picture of stencil paper becomes oblong. Moreover, in order to reduce A4 seal longwise stencil paper to A5 seal, it becomes a sideways picture here. For this reason, the need of returning to an original display by processing rotation of a screen etc. is also generated.
[0057] As mentioned above, three kinds of formats, the page 1 of A4 seal, the page 2 of A5 seal, and the page 4 of A6 seal, are produced. Moreover, about the direction of space, the page 2 of A5 seal, and the page 4 of A6 seal, additional information, such as a page break, is also appended to these, and these information is carried out [being added as a header in front of the data of space, etc. and].
[0058] (A record medium and the data compression method) The archive medium of an image data is made to use memory card in the example. This is considered to be lightweight the smallest also including a driver, and memory card is suitable for this specification. However, if image datas, such as a newspaper and comics, remain as they are, for example, a morning paper (about 40 pages) needs to serve as about 80MB and the huge amount of data, and they need to carry out a data compression. In a number of data compression method, MMR (Modified Modified Relative element address designate)3 which performs image compression by FAX etc. is adopted. A MMR method is because it is used also for the electronic publishing by CD-ROM by or less compressibility 1 [about] / 10 and is technically reliable. Moreover, it uses for putting in many data by using a magneto-optic disk as a preservation record medium.
[0059] (Screen-display control) a record medium -- A -- the screen control in the case of processing electronically the picture for the page 1 of A4 seal, the page 2 of A5 seal, and the page 4 of A6 seal to a longwise data format, and displaying this whole or part on it 400 dpi, 4 seal, at two LCD is shown in following term (1) - (3), referring to drawing 9
[0060] The foundations of screen control are as follows.
(a) Picture (A4 seal 400dpi longwise data format) : a ** A4 seal 1 page display, a ** A5 seal 2 page display, a ** A6 seal 4 page display
[0061] (b) Display screen selection : it is [LCD / ** 2 **] an independent display at a 2-page continuation display and ** 2 ** LCD in a 1-page display and ** 2 ** LCD.
[0062] (c) The display direction selection (direction : four directions) : interlock by independence and ** 2 ** LCD by ** 2 ** LCD.
[0063] (1) an A4 seal 1 page record medium -- A -- screen control is shown in a longwise data format below about the case where the data for the page 1 of A4 seal are processed electronically by the picture of the vertical sense, 400 dpi 4 seal There are the following as a method of displaying the data (all or in part) transmitted to memory (DRAM) from the record medium on two LCD. (Refer to drawing 10)
** Display two LCD as one screen. The display direction has facing up, facing down, facing the right, and facing the left to display.
** right and left -- display one of one LCD as one screen The display direction has facing up, facing down, facing the right, and facing the left to display.
[0064] (2) The page 2 of A5 seal.
a record medium -- A -- screen control is shown in a longwise data format below about the case where the data for the page 2 of A5 seal are processed electronically by the picture arranged sideways, 400 dpi 4 seal There are the following as a method of displaying the data (all or in part) transmitted to memory (DRAM) from the record medium on two LCD.
[0065] ** LCD of two sheets -- as one screen -- right and left of the screen of A5 seal -- choose and display one either The display direction has facing up, facing down, facing the right, and facing the left to display. (Drawing 11 - 12 reference)
[0066] ** It displays one screen of A5 seal at a time on LCD on either side. When the page 2 of A5 seal arranges sideways and is processed electronically, right-hand side A5 seal screen is displayed on right LCD, and left-hand side A5 seal screen is displayed on left LCD. In the display direction, the picture of each LCD has independently facing up, facing down, facing the right, and facing the left to display. (Drawing 13 - 14 reference)
[0067] ** It displays one screen of A5 seal at a time on LCD on either side. When the page 2 of A5 seal arranges sideways and is processed electronically, right-hand side A5 seal screen is displayed on left LCD, and left-hand side A5 seal screen is displayed on right LCD. In the display direction, the picture of each LCD has independently facing up, facing down, facing the right, and facing the left to display. (Drawing 13 - 14 reference)

[0068] (3) an A6 seal 4 page record medium -- A -- 4 seal, 400 dpi, the data for the page 4 of A6 seal are arranged in in all directions [2x2] to the vertical sense, and screen control is shown in a longwise data format below about the case where it processs electronically by the picture There are the following as a method of displaying the data (all or in part) which transmitted to memory (DRAM) and were used as it from the record medium on LCD of two sheets.

[0069] ** As one screen, choose any one sheet of four screens of A6 seal, and display LCD of two sheets. The display direction has facing up, facing down, facing the right, and facing the left to display. (Refer to drawing 15)

[0070] ** Display on LCD on either side two screens of A6 seal. Two screens of A6 seal horizontally located in a line with a top or the bottom when the data for the page 4 of A6 seal were arranged in in all directions [2x2] at the vertical sense and it was processed electronically are chosen, the screen of the right-hand side is displayed on right LCD, and left-hand side A5 seal screen is displayed on left LCD. In the display direction, the picture of each LCD has independently facing up, facing down, facing the right, and facing the left to display. (Refer to drawing 16)

[0071] ** Display on LCD on either side two screens of A6 seal. When the data for the page 4 of A6 seal are arranged in in all directions [2x2] at the vertical sense and it is processed electronically, two screens of A6 seal are arbitrarily chosen as LCD on either side, and are displayed on it. In the display direction, the picture of each LCD has independently facing up, facing down, facing the right, and facing the left to display. (Refer to drawing 16)

[0072] Moreover, please refer to drawing 17 as other examples as a display in the case of having the data format of the page 1 of A4 seal in two memory. Furthermore, when you express the content of a display with two data formats of the page 0.5 of A4 seal, please refer to drawing 18 .

[0073] (Expansion, reduction) An expansion function is shown in following the (1) - (5) below, carrying out the reference reference of drawing 19 . length and width -- an expansion function is similarly committed to which display

[0074] (1) 1-page display : when displaying only 1 page by using two LCD as one screen, expand the whole display screen and reduce. The portion whose display became impossible by expansion can be displayed by the scroll (in the state where it expanded).

[0075] (2) : which considers that 2 pages of continuations are one picture -- if a place with the first page is expanded and it reduces when it continues with the page which are two LCD and the 2-page display of a page is being performed, it will consider that a 2-page indicative data is one, and both pages will be expanded simultaneously For example, the left page (this is also expanded) at the time of expanding a right page etc. can display the portion whose display became impossible by expansion by the scroll (in the state where it expanded).

[0076] (3) 2-page independence : when indicating by 2 page, expand only the page currently displayed on LCD of one side, and the page already displayed on one of the two's LCD displays in the state of a display as it is. It can be chosen which screen is made to expand. The portion whose display became impossible by expansion of the LCD screen of the expanded direction can be displayed by the scroll (in the state where it expanded).

[0077] (4) Consider two LCD to one, and a page carries out the enlarged display only of the page currently displayed on LCD of one side as one screen by 2LCD which one of the two's LCD has also already used, when indicating by independent:2 page. The page currently displayed on one of the two's LCD disappears. It can be chosen which screen is made to expand. The portion whose display became impossible by expansion of the LCD screen of the expanded direction can be displayed by the scroll (in the state where it expanded).

[0078] (5) If LCD (for example, right) of the method of one is made to expand while displaying the whole on one side and displaying 2 pages on one side on expansion:LCD2 screen, already, the screen which was being displayed till then will be erased at one of the two (left), and the display before right LCD is expanded will be given to him. Or 1 page of the whole is displayed. It enables it to distinguish where was expanded by displaying the center (or other specified points) of the portion expanded again here. Moreover, while displaying 1 page as one screen by two LCD, it is also possible to use this function and it will be in the state of the two above screens from the state of one screen by two old LCD at this time. (Drawing 20 - 21 reference)

[0079] (Reference point of expansion) A setup of the reference point of expansion is explained below using drawing 22 . Nine reference points are established in each screen expanding LCD 54-1 and LCD 54-2. Expansion and reduction are performed centering on the reference point. It becomes possible by setting up nine places to expand the whole display screen. As selection of a reference point, one of the screens of LCD 54-1 and LCD 54-2 are chosen, and the place of 1-9 of the reference point established in each screen is chosen and set up by scrolling. Moreover, while choosing the reference point to 1-18 through a whole screen while performing one screen display on LCD 2 screen, or performing both screen display, it sets up so that nine reference points may be prepared on the whole 2 screen. When LCD 2 screen strikes and it already uses it by making one screen only into for enlarged displays as an object for the data display before expanding one of the two's screen, nine reference points are established in the display screen before expansion.

[0080] Moreover, as other examples, if a screen is touched with a finger, a pen, etc., a position will be detected by the

transparent membrane (the electric resistance from the ends of a screen to the touched point is measured, and there are already some which detect a position from the ratio) which detects the position, and it will expand focusing on the point. (Refer to drawing 22)

[0081] (Electronic space data hierarchy) It has the function which can use two, IC memory card and a magneto-optic disk, as a record medium. The document of several volumes is recorded and stored in a magneto-optic disk, the data for one document are transmitted to IC memory card, and the display in the document for one volume uses the data of IC memory card.

[0082] The interior of one volume is hierarchized by a chapter, a page, and the page. a page -- A -- it is a longwise data format 400 dpi 4 seal, for example, is data of 4,736 dots of level 3,232-dot x perpendiculars (about 2 M bytes) A chapter is the unit which collected two or more pages, and a break is decided from the content of a document. A page is space put into the interior of a page, and the case of the page 1 of A4 seal, the page 2 of A5 seal, and the page 4 of A6 seal is in a page.

[0083] (Starting) As starting of the display screen, the power supply of LCD 54-1 and LCD 54-2 is prepared independently. LCD 54-1 can be turned on and the power supply of LCD 54-2 can also be dropped on this example. Moreover, the power supply of LCD 54-1 and LCD 54-2 is switched on, and 1 screen-display mode in which a double-sided display is made to perform, and the mode in which make a double-sided LCD display perform and an independent screen display is performed are formed. furthermore, one side of LCD 54-1 and LCD 54-2 -- only either can be displayed and the power supply of one side can also be made to turn off In every mode, the length of the display screen and a horizontal display can be chosen, respectively. The flow view of screen starting is shown in drawing 23 . The same is said of the flow view of screen starting immediately after power supply ON when reset is inputted.

[0084] To a magneto-optic disk, read-out of the page in one volume and a chapter is operated to read-out of the data of an one-volume unit, record, operation of elimination, and IC memory card (updating). In the page in one volume performed to IC memory card, and operation (updating) of read-out of a chapter, the chapter in which the page which updates the page currently displayed, and which is page-updated and is displayed is contained is updated to the chapter before and behind one, and there is renewal of a chapter which displays the head page etc.

[0085] When it is newly equipped with IC memory card on which the document was recorded and the button of the renewal of the immediately after page or renewal of a chapter is pushed, 1 etc. page of Chapter 1 of IC memory card etc. is displayed by the reduced screen.

[0086] (Renewal of a page) The method which is made to display the data transmitted to memory and updates a page from a record medium is explained with reference to drawing 24 and 25. The following operations are performed by preparing the operation button of the preceding clause and the following term in this display.

[0087] ** Page turning over (return is also included) : when 2 pages which followed two LCD are being displayed, transpose the screen currently displayed on both sides to the data from which both sides are different with operation which turns over a page. For example, while displaying 2 or 3 pages, 4 or 5 pages is displayed. This reverse is also performed.

[0088] ** Page advance (moving down is also included) : when 2 pages which followed two LCD are being displayed, only the first page disappears from a display, it moves to the place where the following page was displayed first, and the following page is displayed further newly. For example, while displaying 2 or 3 pages, 3 or 4 pages is displayed. This reverse is also performed.

[0089] ** 1LCD1 screen page advance (moving down is also included) : when two LCD is being displayed independently, all rewrite the data with which only the page of selected LCD shows, and display the following page newly. For example, while displaying 2 or 3 pages, when LCD which shows 2 **-JI is chosen, 2 **-JI is changed into 3 pages and one of the two's 3-page display does not have a change. The same is said of moving down of a page.

[0090] ** 2LCD1 screen page advance (moving down is also included) : while displaying by using two LCD as one screen, all rewrite the data which show one screen connected with both sides, and display one screen display in the following page similarly.

[0091] (Edit 1) It can edit by recording only the data with which he wishes two IC memory card sockets in IC memory card of Driver A (or B) as Driver A and a driver B into IC memory card of Driver B (or A) using the record and the reproduction button in a control panel. At this time, the display of LCD 54-1 and LCD 54-2 is performed corresponding to Drivers A and B.

[0092] For example, IC memory card containing the record data which become Driver A origin is inserted, and IC memory card of the other party which carries out data transfer to Driver B is inserted. By displaying a certain data in IC memory card with which Driver A is equipped by LCD corresponding to Driver A, it chooses which data are transmitted to Driver B. They are a page including the displayed screen, or data with which the chapter (this is set up) was chosen. Moreover, a certain data in IC memory card of the destination included in Driver B are displayed by LCD

corresponding to Driver B, and it chooses where it transmits. The data in IC memory card of Driver B are overwritten from a page including this displayed screen, or a chapter (this is set up). Or you may overwrite from the degree of a page including this displayed screen, or a chapter. Since the last which it overwrote since the amount of data was not fixed calls a chapter the middle of a certain chapter in IC memory card of Driver B, at this time, the data of the following chapter are erased by overwrite and cease to be saved by the first direction only from the middle.

[0093] In the above, although the display of LCD 54-1 and LCD 54-2 was performed corresponding to Drivers A and B, LCD 54-1 and LCD 54-2 can be used as 1 in all screen, and can also carry out data transfer. First, Driver A is displayed and the data transmitted to Driver B are chosen. Next, LCD 1 and 2 is displayed for the data in Driver B on 1 in all screen, and the destination is chosen. Thereby by LCD1, such as a newspaper, and 2 independent one, it becomes easy to carry out edit of the data of the space which has a fine character on the big screen which is hard to display. Thus, Drivers A and B correspond in both the case where each LCD is used independently, and the case of using two screens as one screen.

[0094] (Edit 2) The edit method at the time of using a magneto-optic disk as a record medium of this example is explained. IC memory card driver of the main part of display is equipped with IC memory card, and the driver for magneto-optic disks is connected to the interface of display. SCSI-2 is adopted as a driver interface of this equipment.

[0095] (1) Data transfer from a magneto-optic disk to IC memory card : in operation of read-out of the data of the one-volume unit from a magneto-optic disk, it updates to ** before and behind one to the turn located in a line with the interior of the magneto-optic disk of ** (one document) in which the page currently displayed is contained, and there is ****** which displays the head page etc. Since displayed ** is transmitted to IC memory card, the data on IC memory card which suited before will be overwritten, and will disappear. When data are stored in the magneto-optic disk, the beginning is equipped with the magneto-optic disk which becomes origin at an optical MAG disk driver, and data are transmitted to IC memory card from a magneto-optic disk. Moreover, after performing a data transfer to IC memory card from the magneto-optic disk into which data went [another] the data of a magneto-optic disk to transmit to a magneto-optic disk again, the magneto-optic disk included in the driver is taken out, and it changes to a magneto-optic disk to put data. And the data included in IC memory card are transmitted to a magneto-optic disk. Since only the capacitive component of IC memory card can be transmitted at this time, it transmits by dividing into abundance to perform the transfer more than capacity.

[0096] (2) Data transfer from IC memory card to a magneto-optic disk : one on IC memory card currently displayed is recordable on the last of the turn of the document already located in a line with the magneto-optic disk per one volume. When former data are in IC memory card, an optical MAG disk driver is connected and data are transmitted to a magneto-optic disk from IC memory card. However, when it cannot record for the reason of capacity by the side of a magneto-optic disk, for example, a shortage, it displays because the red Light Emitting Diode on a control panel switches on the light. When it can record, green Light Emitting Diode lights up. In addition, the unnecessary data in a magneto-optic disk (volume) are displayed, and it can eliminate per one volume by pushing an elimination button.

[0097] Moreover, the case where only one IC memory card driver is prepared in this display is explained as other examples. After transmitting data to a magneto-optic disk to transmit data for the data of a certain IC memory card to another IC memory card at this time, IC memory card of the origin with which IC memory card drive prepared in the main part of display is equipped is changed to IC memory card to put data. Data are transmitted to IC memory card from a magneto-optic disk after that.

[0098] (Operation button) it is shown in drawing 26 -28 -- as -- a power supply button, LCD 54-1, and LCD 54-2 -- the screen drive button which was alike, respectively and corresponded -- The preceding clause button 70 which is a page turning-over function, the following term button 69, the length of a display, The selection button of a horizontal display, the expansion button 67, the reduction button 38, the menu button on which the content of data is displayed, and the page which was being displayed on the last are made to memorize, it gets down, and the button 62 and the scrolling button 80 which can choose four directions are equipped.

[0099] Furthermore, the record button 79, the reproduction button 60, the expansion button 67, the reduction button 68, the button 80 in which the direction of the four directions corresponding to scrolling is shown, the preceding clause button 70 which can perform page turning over, and the button 69 of the following term are main. moreover, a bookmark -- there is a button 62 as a function and the page which was being read at the end is memorized, and when a power supply is switched on again, it has the button which displays the same page It has the volume which adjusts a power supply button, a reset button, and contrast. Corresponding to each drive, LCD 54-1 and LCD 54-2 can also display considering two record-medium sockets as Drive A and drive B like a radio cassette recorder by the main function [in / this display / in record and a reproduction button].

[0100] (Basic composition) The composition of a book-mold display is described hereafter. Two liquid crystal modules were used for this equipment supposing the configuration of a book mold. Moreover, it displays on LCD (liquid crystal

display) of each by using a LCD timing controller.
[0101] The basic block diagram of a control unit is shown in drawing 29 . The composition of equipment is divided into two, the display of LCD 54-1 and LCD 54-2, and the electronic-circuitry section. The main components of the electronic-circuitry section hold an image data. The VRAM circuit section 516 and space data which are outputted to LCD The timing of the data transfer to the record intermediation soma 522 to input, the DRAM circuit section 515 of memory which holds temporarily the space data inputted from the record medium 52, compression/extension section 513 which performs compression/extension of space data, the microcomputer section 512 which performs processing of data, and LCD It consists of the LCD controller circuit section 515 to take and a control unit 519 which controls operation (expansion/reduction of a picture, page turning over, etc.) of display. And two LCD54 which receives and displays data from these circuits is equipped. In order to reduce part mark, the gates, such as a timing circuit, are made to build in in PLD (Programable Device)514 as much as possible.
[0102] (LCD) In this example, LCD also took the cost side into consideration and used the STN reflection type of monochrome. Although two, a STN type (Super Twisted Nematic) and a TFT type (Thin Film Transister), are in the form which is the mainstream of the present LCD, a 2 to 3 times as many difference as this exists in a present stage in respect of cost. When the product of this development was considered by the concept of "one person [one]", since significance was very high, the problem of a price adopted the STN reflection type of monochrome with a cheap unit price by this example. In the future, adoption of other things, such as a color and a TFT type, is also possible.
[0103] The interface of LCD and the electronic-circuitry section is two, the data to LCD, and a timing signal.
[0104] (Electronic-circuitry section) Below, detail of the electronic-circuitry section is given. The DRAM circuit section 515 holding the image data of space, the VRAM circuit section 516 outputted to LCD, and the LCD timing controller circuit section 515 which performs data output to LCD are explained in full detail. An electronic-circuitry configuration block view is shown in drawing 30 .
[0105] (DRAM circuit) It restores to the original data in compression/extension circuit 513, and 1 page (2 M bytes) of space data included in the record medium is held in the DRAM (Dinamic RAM) memory 515. In other examples, the data for 2 pages (4 M bytes) may be held in memory, and the data corresponding to 2 screen independent display operation may be held. Since a display uses LCD54 of 640x480 dots, it thins out and displays this data. The data array when holding the binary data which image data developed in DRAM temporarily is shown in drawing 31 .
[0106] Compression extension of MMR was carried out to carrying out by hardware by this example. The direction performed by hardware is able to raise a working speed rather than carrying out by software. In this example, a MMR compression extension chip called DICEP-E1 is used as hardware 513 for compression extension.
[0107] (VRAM circuit) The VRAM circuit 516 makes a display mode correspond, thins out the space image data from the DRAM memory 515, after it performs array conversion etc., it records it temporarily, and it has the function outputted to the LCD timing controller 514. VRAM (Video RAM)516 adopted this time is 2Mbit multiport Video RAM which consists of 256 k-word x8bit SAM (Serial AccessMemory) sections. VRAM516 is formed corresponding to each LCD. The data capacity of one screen is display capacity 640x480 dot =300k bits of LCD, and can also accumulate the data for a number screen.
[0108] Since the RAM section and the SAM section can operate to independent asynchronous, RAM and bidirectional data transfer between SAM can be carried out not related from CPU of the microcomputer section by access to RAM. A space image data is sent out to the LCD timing controller 514 from the serial port of VRAM. The VRAM circuit 516 consists of the above mentioned in the circumference circuit for performing read/write from CPU, the circuit which measures RAS and CAS timing in accordance with a memory access demand arbiter, the address multiplexer circuit, the address decoder circuit, etc.
[0109] (LCD timing controller circuit) The LCD timing controller 514 outputs the data from VRAM516, and has the function on which it is made to display in LCD. LCTC (LCD Timing Controller IC) receives the space image data outputted from VRAM516 in 16 bit-serial input, and sends out data with a 8-bit output synchronizing with the signal for driving LCD. For this reason, the LCD timing control circuit which doubles the data output timing from VRAM and the data output timing from a LCD timing controller to LCD is prepared. Moreover, this circuit detects the data incorporation first timing of a LCD timing controller. Two LCTC(s) are prepared corresponding to two LCD.
[0110] (Data array) Next, how to rearrange an array and to display the data from DRAM515 by software is explained. The data array to DRAM, VRAM, and LCD has a method as shown in drawing 10 -18. First, if data are taken in to DRAM by the data format of A 4th edition 1 page longwise / 400dpi which is a standard in this example, in order to display a page with the earlier term of the taken-in data on a LCD right screen, it is made for a previous page to come to the upper half of the A 4th edition length in the place of the data-hold of the first record medium. As foundations, as for the data input to DRAM, the data of a previous page are always put into an upper half at the time of the A 4th edition length, and it puts into a right-hand side half at the time of the A 4th edition width.

[0111] Even if data of this inputting method increase or a format replaces, the data introduction by DRAM is the input method near foundations like drawing 31 , and it is made to come to the right-hand side half of LCD. For example, if the A 4th edition length and the data for 2 pages are taken in to DRAM, the page data of the earlier one will be thinned out in the capacity of 640x480 which is data in the upper half of DRAM, and will be transmitted to LCD. Similarly, data are thinned out and transmitted to 640x480 also about the remaining pages. Here, the data array from DRAM to VRAM is determined by the display mode to LCD.

[0112] When incorporating data to DRAM515 by standard format and performing a canonical mode (display of the 2nd page page continuation of a double door) to LCD54, VRAM516 is made to correspond to each of LCD54, and it divides into two, and the right screen of LCD54 is corresponded to the earlier one of the address of VRAM516, and a left screen is made to correspond to the later one. VRAM memory is made to correspond to LCD 54-1 and LCD 54-2, and is divided into two.

[0113] (A4 ****, 1 page) When 1 page of display pages is contained in the format, data are made to arrange as an array of the data incorporated into the earlier one of the address of VRAM516, so that the data of eye indicative-data top 1 train of DRAM515 may come to the head of a column address. Since the array conversion to VRAM is decided by where [the right-and-left upper and lower sides and] the array of the indicative data of DRAM515 is located in a line, as shown in drawing 10 , by the criteria data format, data are incorporated to DRAM.

[0114] When indicating LCD54 by 1 screen longwise, the page data which the data of DRAM515 want to display are transmitted to the start address of VRAM516 in order of the address. In order to display 1-page data on LCD 2 screen at this time, it transmits by dividing a DRAM indicative data into two in the address.

[0115] (A4 ****, 2 pages) When 2 pages of display pages are contained in the format, data are made to arrange as an array of the data incorporated into the earlier one of the address of VRAM516, so that the data of the page 1 top of an indicative data of the 1st line of DRAM515 may come to the head of a row address. Since the array conversion to VRAM is decided by where [the right-and-left upper and lower sides and] the array of the indicative data of DRAM515 is located in a line, as shown in drawing 11 -14, by the criteria data format, data are incorporated to DRAM515.

[0116] Moreover, when displaying oblong 2 pages of display screens of LCD, address two piece housing of the data which you want to display from DRAM515 is carried out, and the initial data of the address which transmitted start-address data to the right screen of LCD, and halved them are transmitted to the left screen of LCD. When transmitting, it thins out in 640 for 1 low of a LCD indicative data, and transmits to the address of VRAM516.

[0117] When indicating the LCD by 1 screen oblong, the page data which the data of DRAM515 want to display are transmitted to the start address of VRAM516 in order of the address. In order to display 1-page data on LCD 2 screen, it transmits by dividing a DRAM indicative data into two in the address. When carrying out longwise one screen display of LCD, the data of one column of DRAM515 are transmitted to 1 low of VRAM516. At this time, data are divided in the column of the half of the indicative data of DRAM515, and it transmits to each of VRAM516. According to the number of display dots of LCD, data are thinned out at the time of a transfer.

[0118] (A4 ****, 4 pages) When 4 pages of display pages are contained in the format, as an array of the data incorporated into the earlier one of the address of VRAM516, first, the page 4 of an indicative data of DRAM515 is halved in the address, and a start address is further halved in a column. Data are made to arrange so that the last column data of 1 low eye may come to the head of the row address of VRAM516. Since the array conversion to VRAM516 is decided by where [the right-and-left upper and lower sides and] the array of the indicative data of DRAM515 is located in a line, as shown in drawing 15 -16, by the criteria data format, data are incorporated to DRAM. Moreover, when indicating oblong 2-page display and the LCD for the display screen of LCD by 1 screen oblong, a data transfer is similarly performed by the above-mentioned method.

[0119] As the data infanticide method, ** RI, the (black) of binary data, and the (black) of data (white) are incorporated for the OR of ****** data by priority. This is performed about both a low (line) and a column (train), and it carries out combining the OR of a low and a column to each display mode. For example, in a whole display, an OR is taken for the original data about both a low and a column, and an infanticide indication of data is given on the basis of the intersection point of the head of a row address and a column address. When data exceed the number of display dots of LCD, it thins out to the number of data near the number of display dots of LCD, and the remainder is omitted. On the contrary, (white) data are put in and displayed when few.

[0120] (Software) Fundamentally, this display performs specific operation according to it, when the button shown in drawing 26 -28 is pushed. Each button shown in drawing 26 is enumerated and explained below. The inside of a parenthesis shows the button on a panel. Moreover, a processing flow is shown in drawing 32 -35.

[0121] (Screen-display mode) As screen-display mode, it is **2 screen independent display mode (A of LCD on either side and B screen make it display independently). A driver A51 is expressed as A screen, and the data of driver B-52

are expressed as a B-52 screen. There are really [**2 screen] the two modes of a display (they are displayed using A of LCD on either side and B screen as one.).
[0122] (Movement from immediately after powering on) Immediately after powering on, the 1st page of a driver A71 is displayed on both LCDA and B. If the data format in IC memory card is a page 1 of A4 seal, 1 page will be sideways displayed to display using two screens. If it is a page 2 of A5 seal, it will display 1 page at a time on LCD on either side. If it is a page 4 of A6 seal, it will display 1 page of two upper screens at a time on LCD on either side. It is changeless even if the reproduction button A is pushed.
[0123] (1) Screen A, Screen B (A, B) : choose Screen B (left screen) by pushing Screen A (opening right screen) and the screen B button 77 by pushing the screen A button 76.
[0124] (2) Driver C (C) : choose Driver C (for magneto-optic disks) by pushing the driver C button 78.
[0125] (3) Reproduction (re-60A, re-60B) : order it the display of the document accumulated in IC memory card of the 1st page. It reads from IC memory card of a driver A71 (B-52) with the reproduction button of reproduction 60A (60B).
[0126] ** . If reproduction button 60A (60B) is pushed without pushing the screen button A76 and the screen button B77, the 1st page of a driver A71 (B72) will be displayed on LCDA and B both (2 screen one display).
[0127] ** . If reproduction button 60A (60B) is pushed after pushing the screen button A76 (B), the 1st page of a driver A71 (B72) will be displayed on LCDA (B) (2 screen independent display). When it is really [2 screen] displaying and considers as 2 screen independent display at first, the display screen of a basis is displayed on reduction and LCDB (A).
[0128] ** If reproduction button 60A (60B) is pushed after pushing 'screen button A76 (B), the 1st page of a driver B72 will be displayed on LCDA (B) (2 screen independent display). the case where are performing 2 screen independent display and it considers as 2 screen independent display at first -- LCDB (A) -- a basis -- the screen currently displayed on LCDA (B) is displayed When it is really [2 screen] displaying and considers as 2 screen independent display at first, the display screen of a basis is displayed on reduction and LCDB (A).
[0129] ** Although which method is sufficient as **', which is chosen determines from the beginning.
[0130] ** if reproduction button 60B is pushed after pushing the screen button C78 -- a magneto-optic disk (driver C) -- most, transmit the first data for one volume to IC memory card of a driver B72, and display the page of the beginning in one volume of a driver B72 on LCDB However, if reproduction button 60A is pushed, having pushed the screen C button 78 will be disregarded and it will display the page of the beginning in a driver A71 on LCDA.
[0131] (4) Record (**) : if the ** record button 79 and both the buttons of reproduction button 60A are pushed simultaneously, the page displayed on LCDA will overwrite the degree of the page displayed on LCDB of drive B72, and will be copied to it.
[0132] ** If chapter button 63A or the ** button 64 is pushed just before pushing simultaneously the record button 79 and both the buttons of reproduction button 60A, the chapter or ** containing the page displayed on LCDA will overwrite the degree of the page displayed on LCDB of drive B72, and will be copied to it.
[0133] ** pushing the record button 79 -- the 1st page of a driver A71 -- LCDA -- the 1st page of a driver B72 -- LCDB -- simultaneous -- displaying .
[0134] (5) Elimination (**) : if the ** elimination button 61 and both the buttons of reproduction button 60B are pushed simultaneously, the page displayed on LCDB will be eliminated from the magneto-optic disk of Drive C.
[0135] ** If chapter button 63B or the ** button 64 is pushed and the screen button C is pushed just before pushing simultaneously the elimination button 61 and both the buttons of reproduction button 60B, the chapter or ** containing the page displayed on LCDB will be eliminated from a magneto-optic disk.
[0136] (6) The last page, the following page (before, degree) : display that the page in front of one (degree) pushes the before (degree) page buttons 70A and 70B and the following page buttons 69A and 69B. It carries out by following button A (B) a front by being attached to the data of IC memory card of a driver A71 (B72).
[0137] (7) ** (volume) : push ** ** button 64 and display the page of the beginning of ** one by one.
** Display that the ** button 64 is pushed and the page in front of one (degree) pushes the before (degree) page button 70 (69).
** The record button 79 and the elimination button 61 perform ******.
[0138] (8) Chapter (Chapter A, Chapter B) : push ** chapter 63A (63B), and display the page of the beginning of sequential and a chapter per data of IC memory card of a driver A71 (B72).
** Display that chapter 63A (63B) is pushed and the page in front of [per data of IC memory card of a driver A71 (B, 71)] one (degree) pushes a before (degree) A(B) page button (70A (69A)).
** A record button and an elimination button perform chapter specification.
[0139] (9) Rotation (time) : whenever it pushes the rotation button 65, rotate a screen 90 degrees in the clockwise

direction.

[0140] (10) double-sided (both -- A -- both -- B): -- if double-sided button 66A (66B) is pushed when really [** 2 screen] displaying, it will display on LCDA (B) One of the two displays nothing.

** If double-sided button 66A (66B) is pushed when indicating by 2 drawing independent side, two LCD will be displayed for the screen of LCDA (B) as one screen.

[0141] (11) expansion (**A, **B): -- if expansion button 67A (67B) is pushed when really [** 2 screen] displaying -- LCDA and B -- nine expansion reference points each (18 in all) are displayed If one of the expansion reference points is selected by cursor 80A (80B) and expansion button 67A (67B) is pushed after that, as one screen, double-precision expansion will be carried out and LCDA and B will be displayed.

[0142] ** If expansion button 67A (67B) is pushed when 2 screen independent display is being performed, nine expansion reference points of LCDA (B) will be displayed. One of the two's LCD already has no change. If one of the expansion reference points is selected by cursor 80A (80B) and expansion button 67A (67B) is pushed after that, in the screen of LCDA (B), double-precision expansion will be carried out and it will display. If it is the same expansion reference point to expand again, expansion button 67A (67B) is pushed twice. (Selection of an expansion reference point is omissible.)

[0143] (12) Reduction (**A, **B) : when really [** 2 screen] displaying, if reduction button 68A (68B) is pushed, the portion displayed until now will be set as the center of a screen, LCDA and B are used as one screen, and 1 / 2 reduced displays are carried out. If it is the same expansion reference point to reduce again, reduction button 68A (68B) is pushed. When the data displayed from the number of dots of LCD become small and the internal portion of data is made on the screen reduced most on LCD, the portion is considered as the uniform display of white or black (or you may display information, such as a document name). Although the upper and lower sides prepare this portion equally to display, the portion in which right and left faced the ginglymus is not prepared, but is prepared only in the reverse. The screen displayed on two LCD by this is connected, and is displayed.

[0144] ** If reduction 68A (68B) is pushed when 2 screen independent display is being performed, in the screen of LCDA (B), the portion displayed until now will be set as the center of a screen, and 1 / 2 reduced displays will be carried out. When the data displayed from the number of dots of LCD become small and the internal portion of data is made on the screen reduced most on LCD, the portion is considered as the uniform display of white or black (or you may display information, such as a document name). This portion is prepared equally [four directions] to display. The screen displayed on two LCD by this is displayed independently.

[0145] (13) -- bookmark: -- a bookmark -- a screen when the power supply button 81 was turned off after pushing the button 62, and turned on after that, just before turning off is displayed

[0146] (14) Cursor (cursor 80A, cursor 80B) : when really [** 2 screen] displaying, move the four directions of both screens by cursor 80A (80B).

** When 2 screen independent display is being performed, move the four directions of LCDA (B) by cursor 80A (80B).

** Choose an expansion reference point.

[0147] (Communication facility) It is possible to add functions, such as a FAX modem, a telephone function, and a GPS receiver, to a driver B72 as the shape of a card by PCMCIA specification etc. as option of display. Moreover, if it is a GPS receiver in Driver B, these are inserting in a driver B72 and inserting space information, such as map information, in a driver A71, and can also perform combination of space information and additional information. Moreover, it is also possible to form the driver D of exclusive use for these communication facility.

[0148]

[Effect of the Invention] According to the image display equipment of this invention, corresponding to the spread display of a book, a picture can be displayed by having two LCD of the latus screen, and a LCD screen can be displayed by the kind and indicative data of a book by various methods, such as an oblong display, a longwise display, a 1 screen independent display, or a 2 screen one apparatus display. From this, since the display united with the indicative data can be performed, a user becomes possible [reading by one's favorite legible means of displaying], compensates the resolution of LCD, and can also perform a lot of data display, such as a magazine.

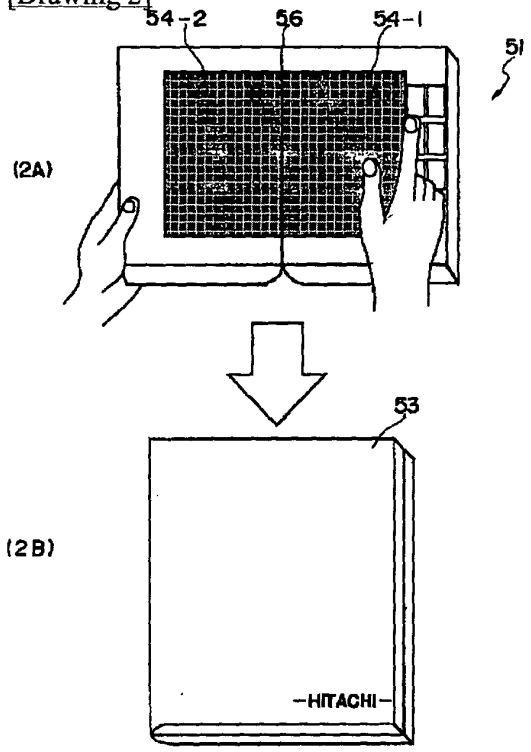
[0149] Therefore, it can be used that there is no sense of incongruity as image display equipment replaced with a book, and that electronic media information can be displayed by the **** volume by exchanging record media, and the image display equipment which has the same display function as a book can be offered.

[Translation done.]

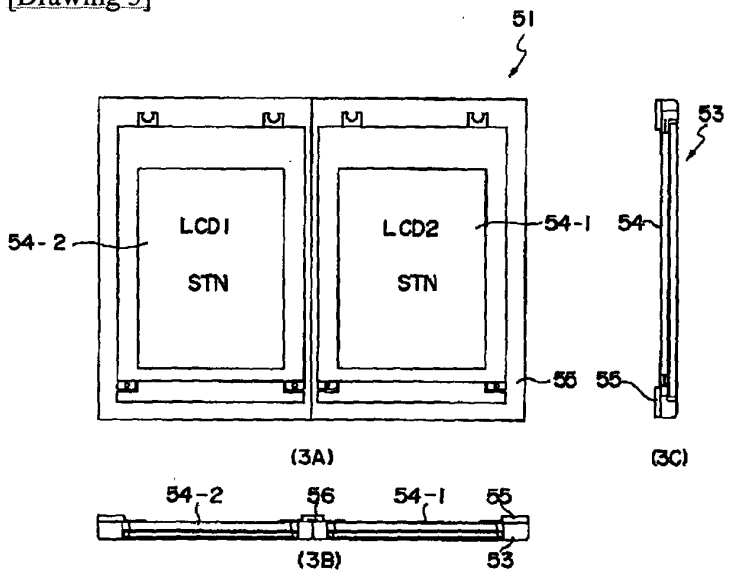
* NOTICES *

DRAWINGS

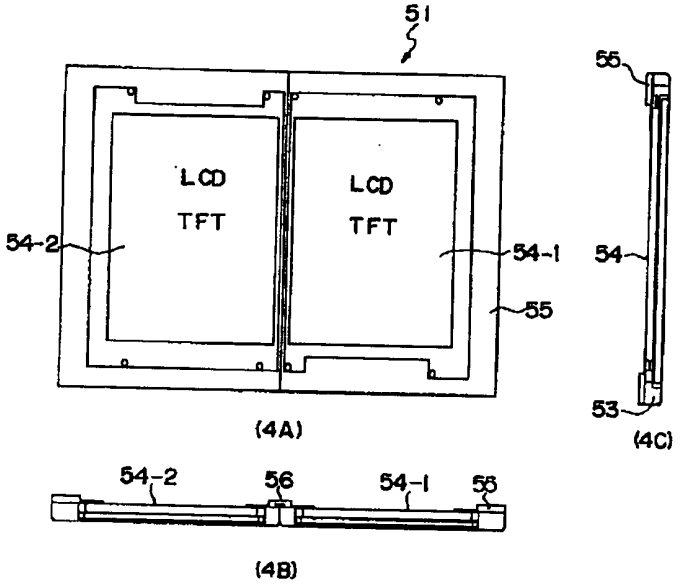
[Drawing 2]



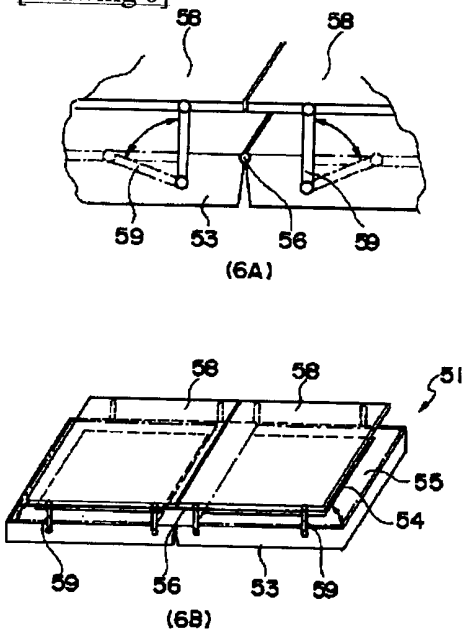
[Drawing 3]



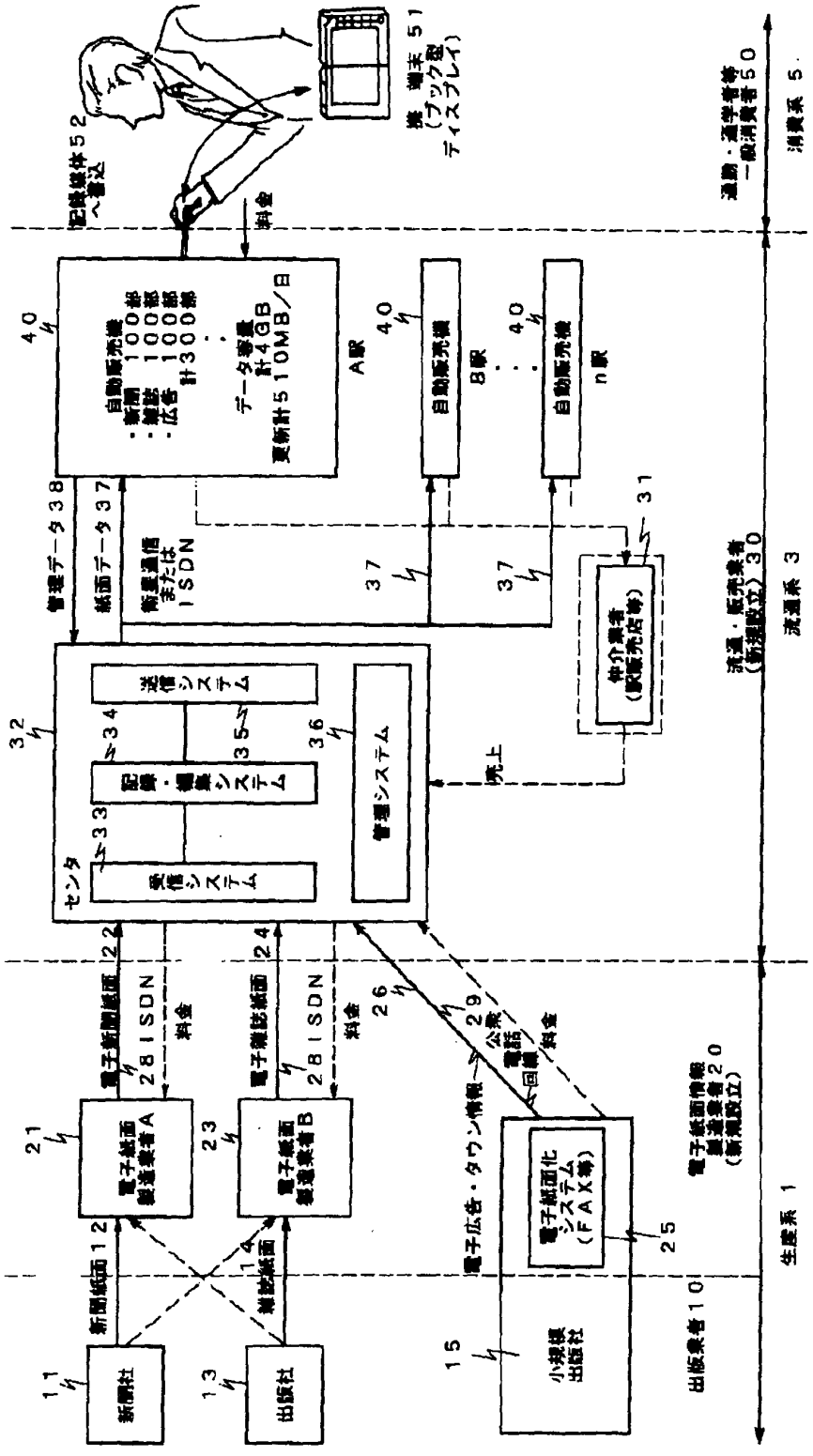
[Drawing 4]



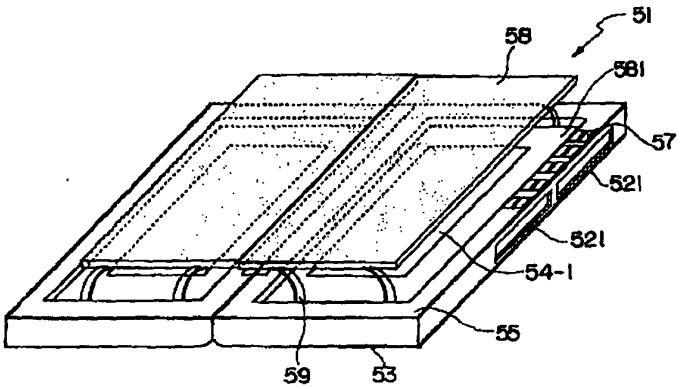
[Drawing 6]



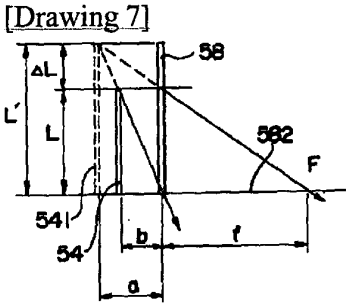
[Drawing 1]


端末51
(ブック型
ディスプレイ)
記録媒体52
へ蓄込
料金
通勤・通学者等
一般消費者50
消費系 5
自動販売機
・新聞 100部
・雑誌 100部
・広告 100部
計300部
・
・
データ容量
計4GB
更新計510MB/日
40
A駅
40
自動販売機
B駅
・
・
40
自動販売機
n駅
管理データ38
紙面データ37
衛星通信
または
ISDN
37
37
31
仲介業者
(販売店等)
流通・販売業者
(新規設立)30
流通系 3
送信システム
34
35
配信・編集システム
36
管理システム
33
受信システム
センタ
32
売上
電子新聞紙面
22
28 ISDN
料金
電子雑誌紙面
24
28 ISDN
料金
26
29
公衆
電話
回線
料金
電子広告・タウン情報
電子紙面化
システム
(FAX等)
25
電子紙面情報
配達業者20
(新規設立)
電子紙面
配達業者A
21
電子紙面
配達業者B
23
新聞紙面12
雑誌紙面
14
小規模
出版社
15
出版業者10
生産系 1
新聞社
11
出版社
13

[Drawing 5]



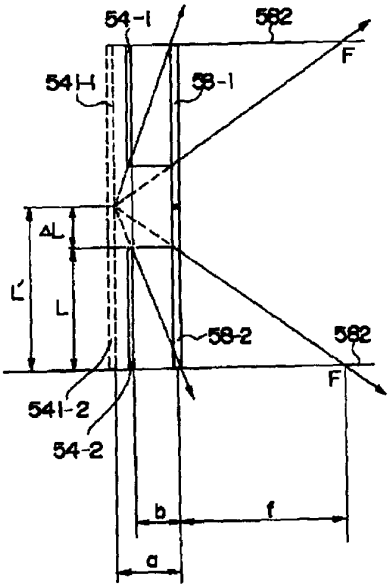
[Drawing 7]



$$\begin{cases} \frac{1}{b} - \frac{1}{a} = \frac{1}{f} & (1) \\ \frac{L}{L'} = \frac{b}{a} & (2) \end{cases}$$

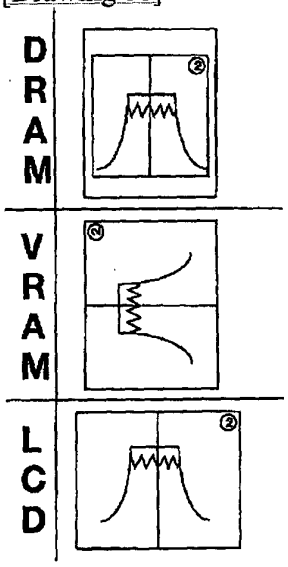
a：拡大レンズとＬＣＤの虚像の間の距離
b：拡大レンズとＬＣＤの間の距離
f：拡大レンズの焦点距離
L：ＬＣＤの長さ
L'：ＬＣＤの虚像の長さ

(7A)

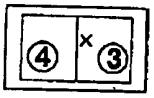


(7B)

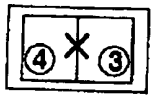
[Drawing 18]

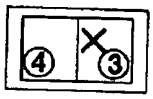


[Drawing 19]

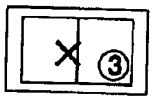


③,④２ページ同時拡大

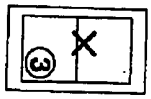




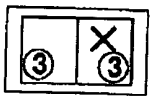
④はそのままで③ページだけ拡大される。



or

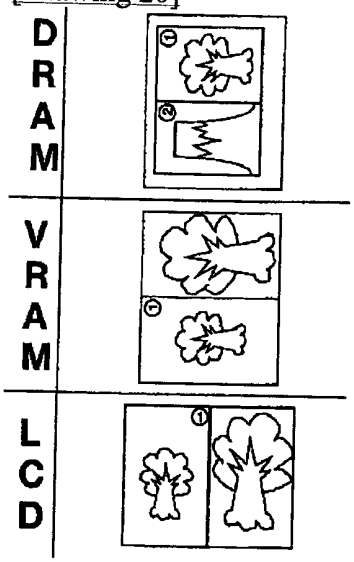


③ページのみを２画面に拡大して出す。（縦、横は選択可）

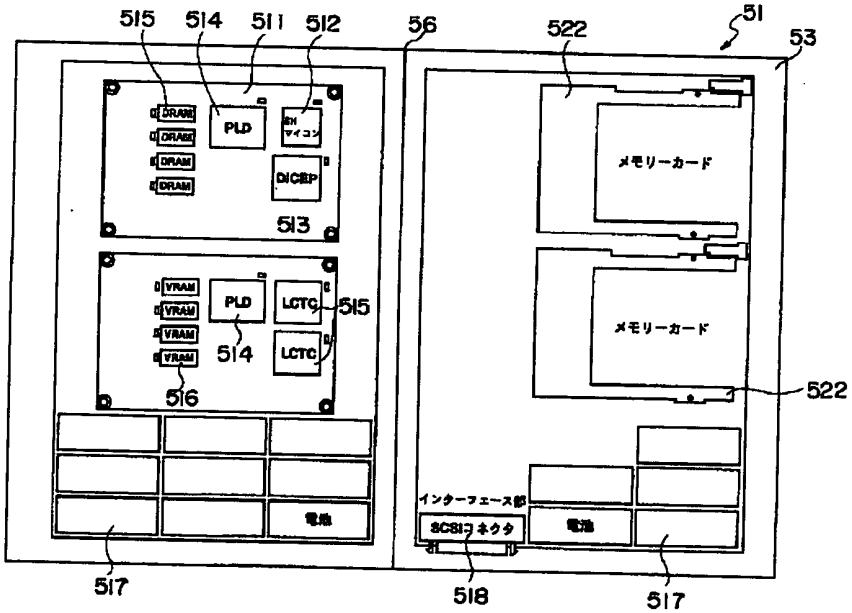


拡大する時に片面に標準表示を行い、もう片方の画面でその表示の拡大を行う。全体表示を常に片面に表示させておく。

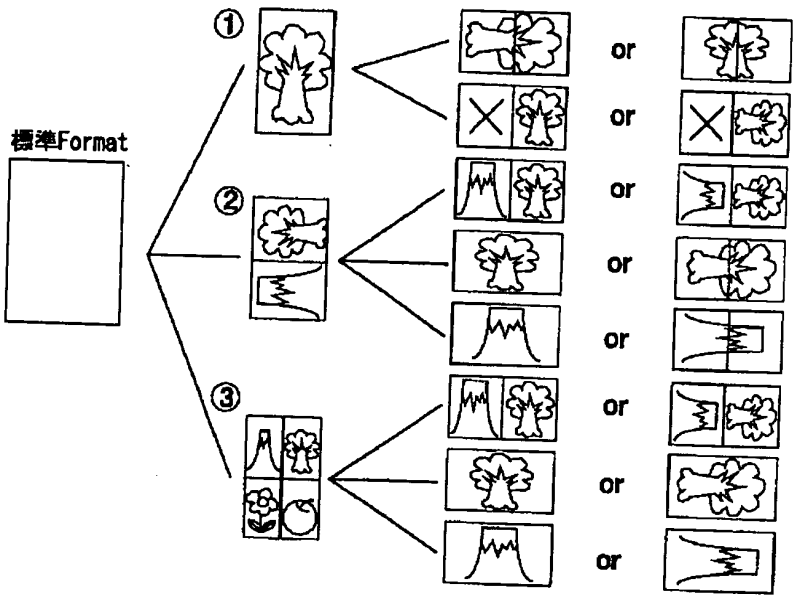
[Drawing 20]



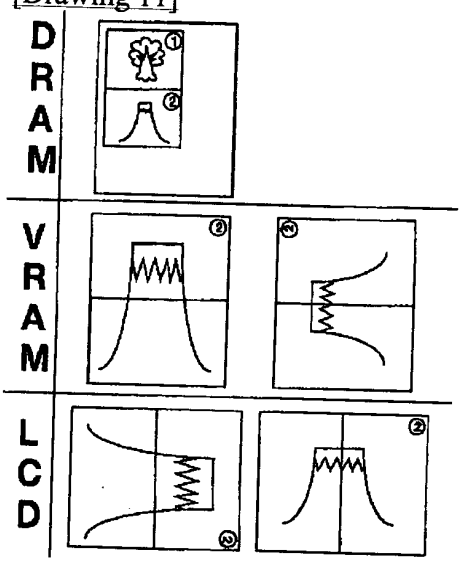
[Drawing 8]



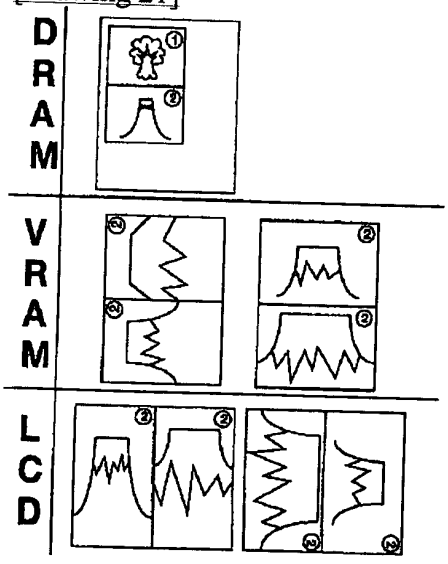
[Drawing 9]



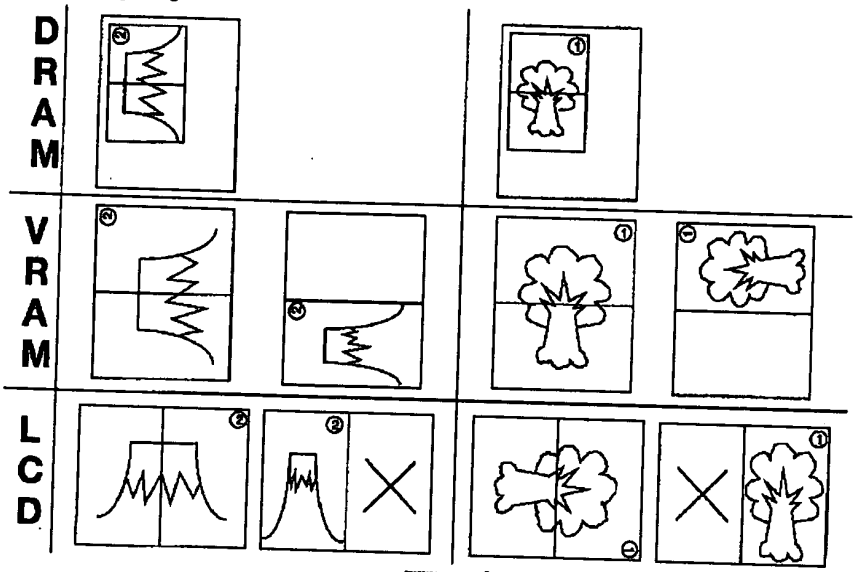
[Drawing 11]



[Drawing 21]

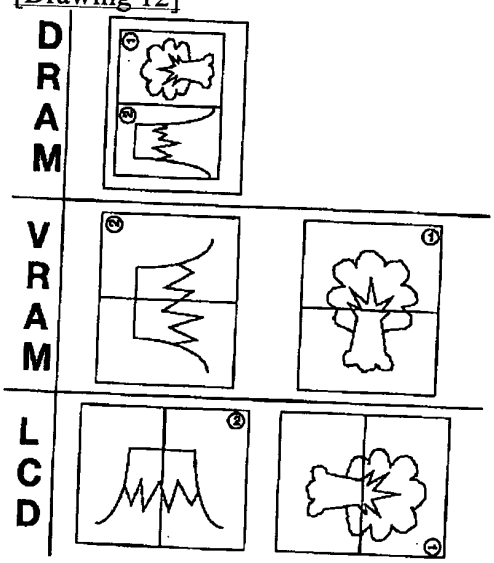


[Drawing 10]

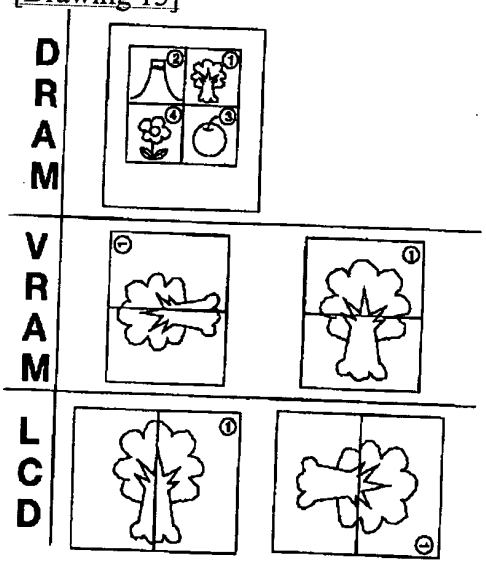


画面制御表示

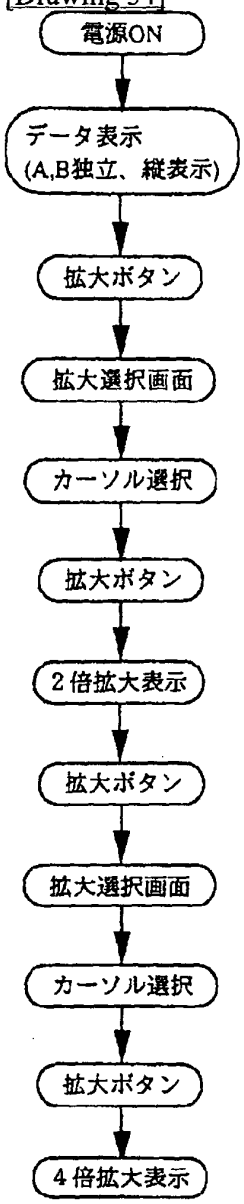
[Drawing 12]



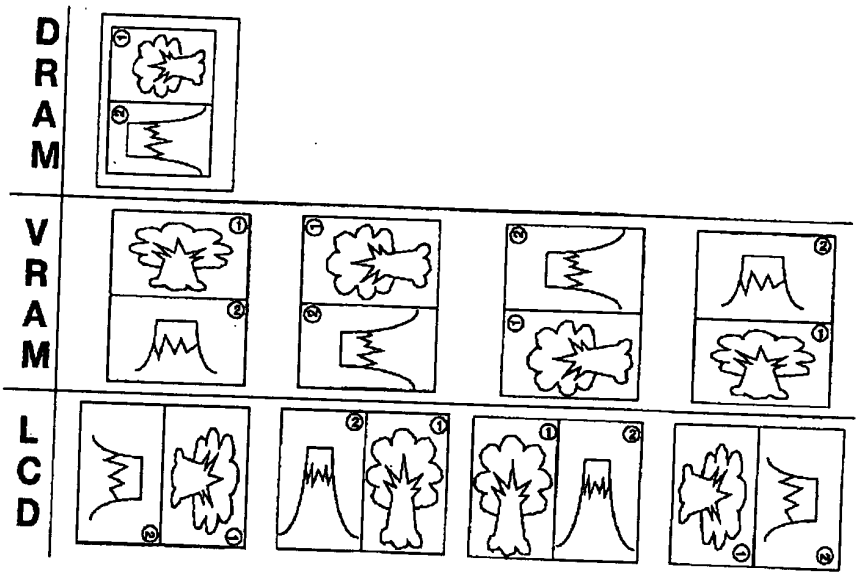
[Drawing 15]



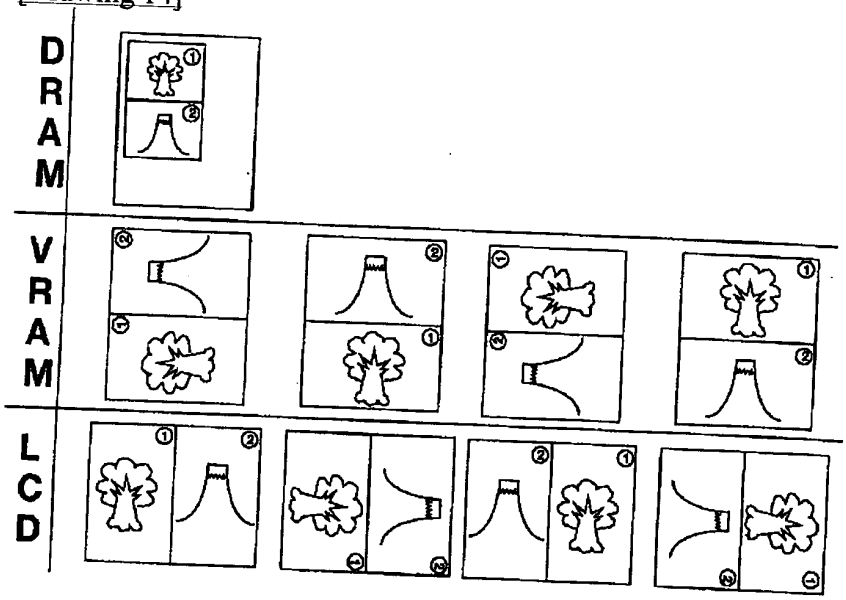
[Drawing 34]



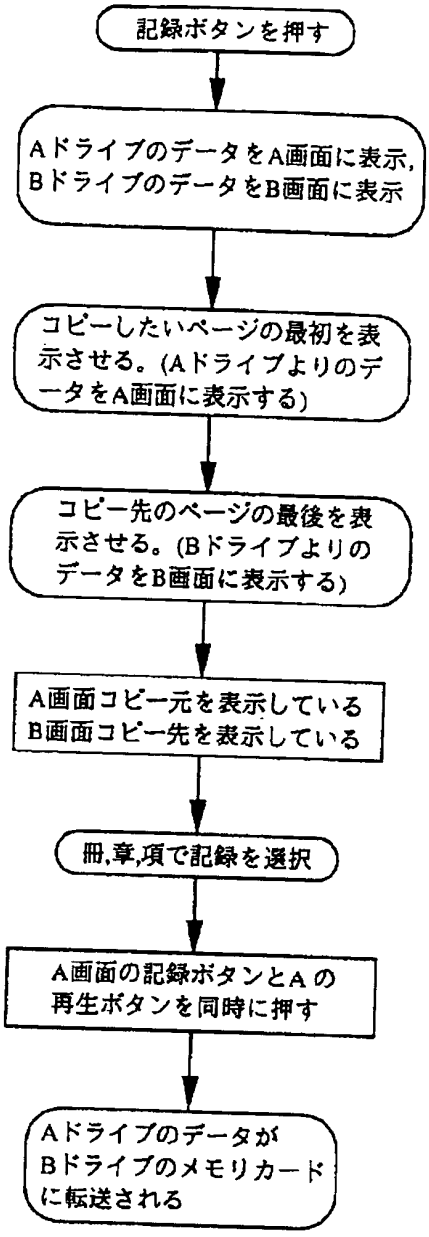
[Drawing 13]



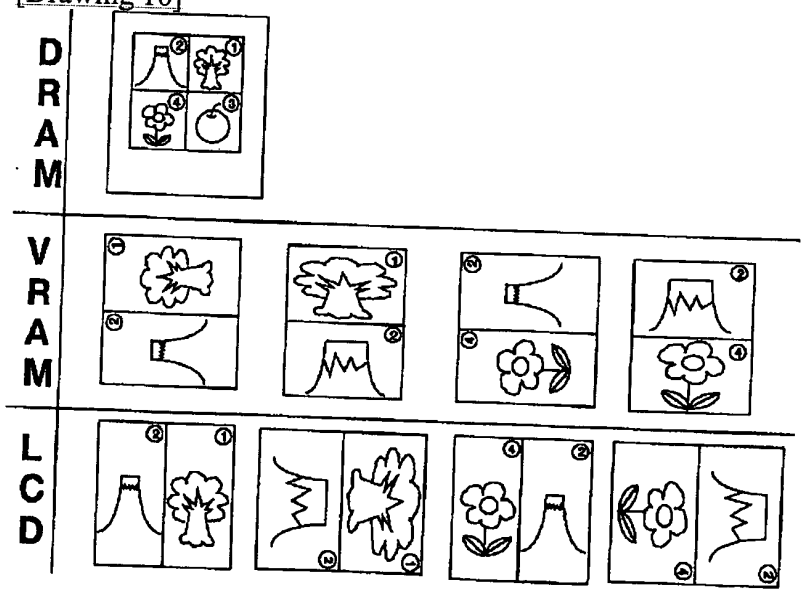
[Drawing 14]



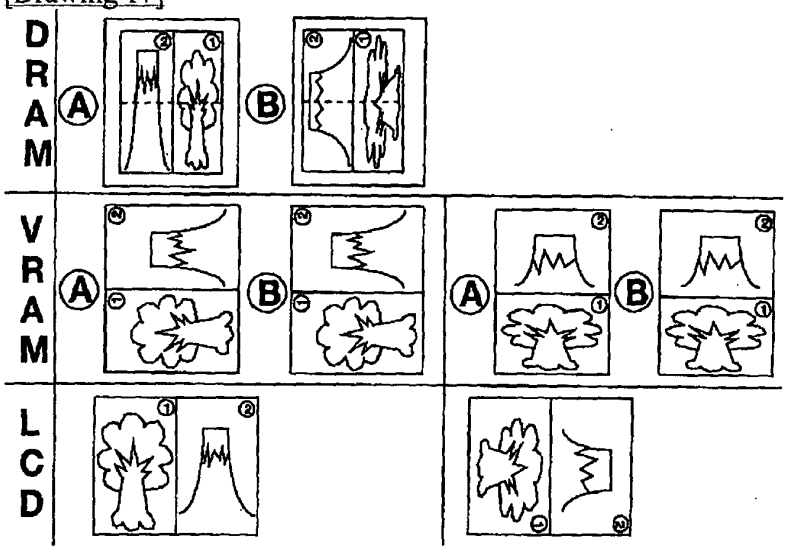
[Drawing 35]


記録ボタンを押す
Aドライブのデータを A画面に表示,
Bドライブのデータを B画面に表示
コピーしたいページの最初を表示させる。(Aドライブよりのデータを A画面に表示する)
コピー先のページの最後を表示させる。(Bドライブよりのデータを B画面に表示する)
A画面コピー元を表示している
B画面コピー先を表示している
冊,章,項で記録を選択
A画面の記録ボタンとAの再生ボタンを同時に押す
Aドライブのデータが
Bドライブのメモリカードに転送される

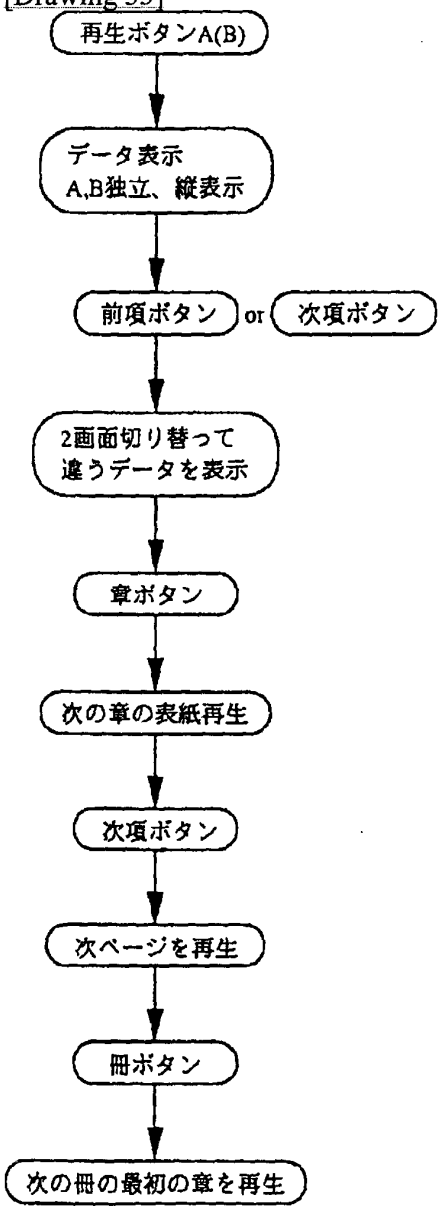
[Drawing 16]


DRAM
VRAM
LCD

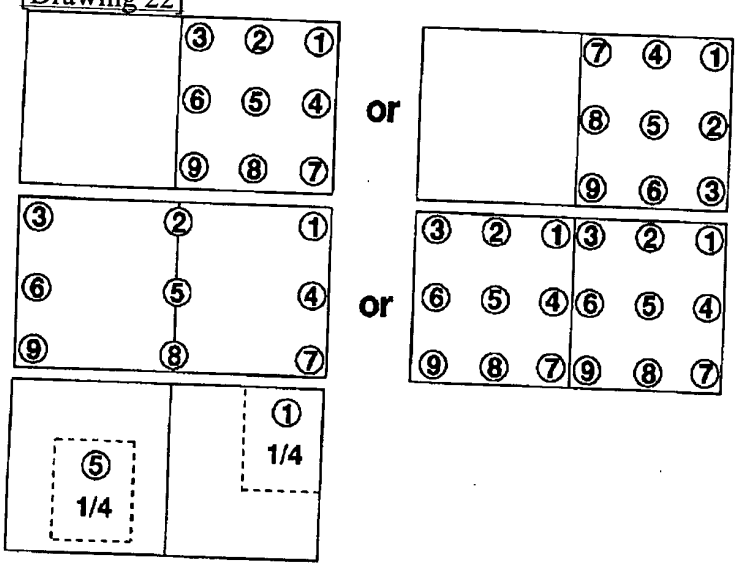
[Drawing 17]



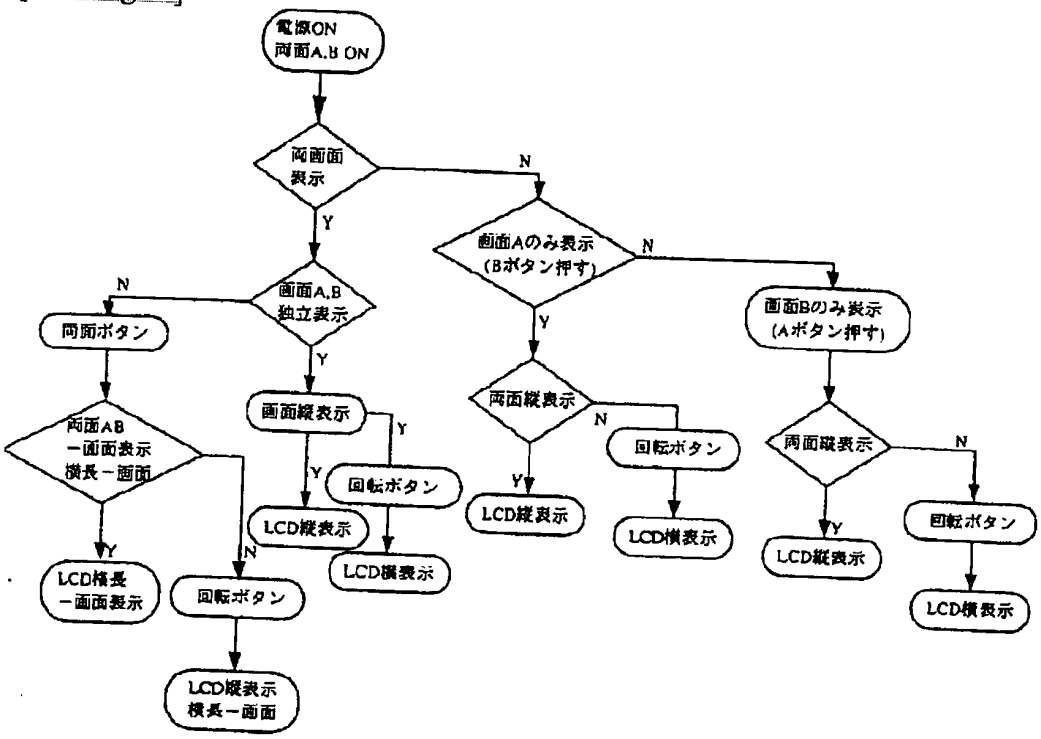
[Drawing 33]



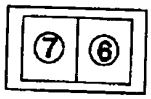
[Drawing 22]



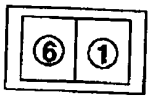
[Drawing 23]



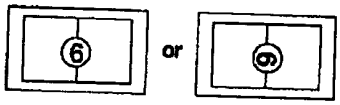
[Drawing 25]



2ページセットで選択する。

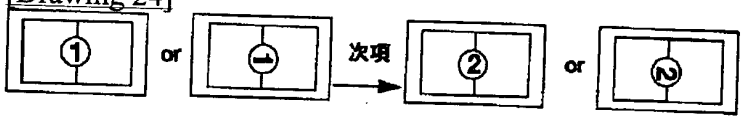


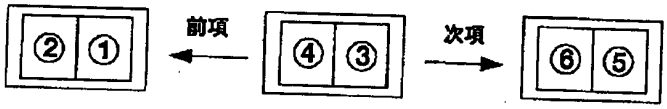
片面はそのままで片面に
選択ページを表示する。

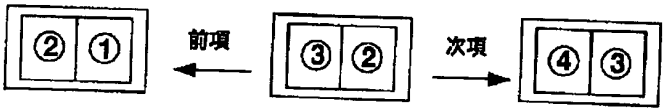


選択⑥ページだけを
表示する。

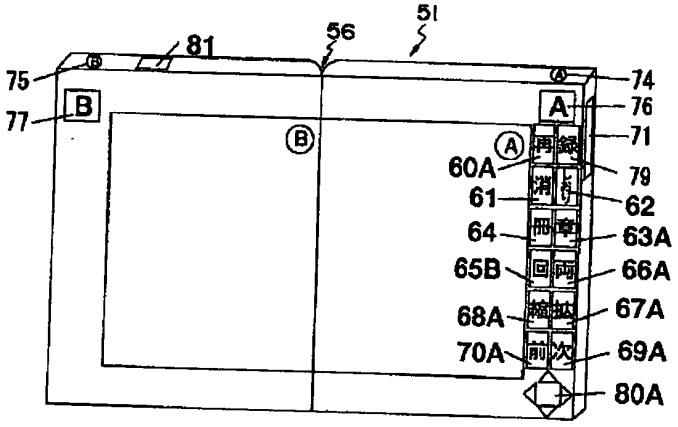
[Drawing 24]



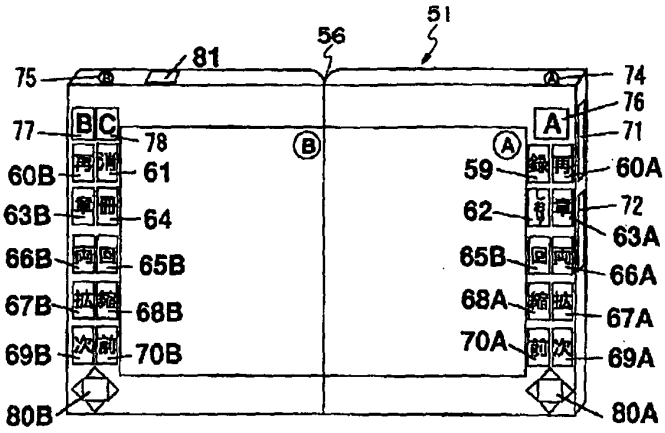




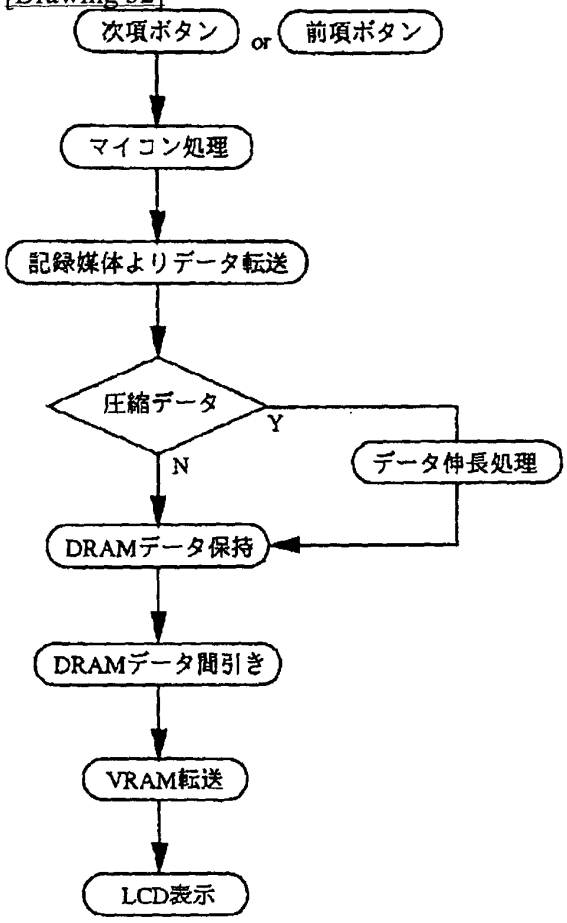
[Drawing 26]



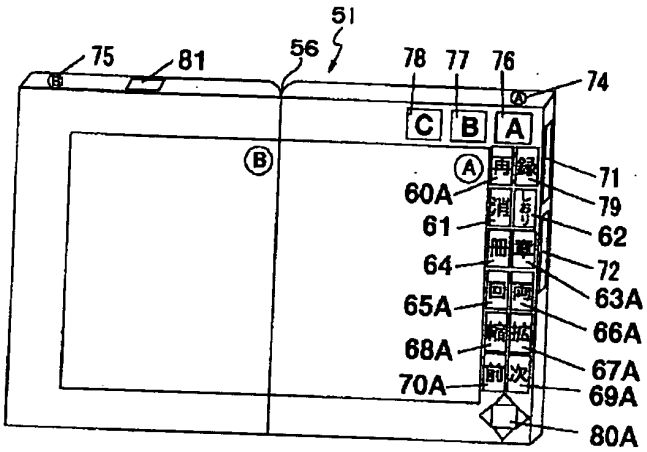
[Drawing 27]



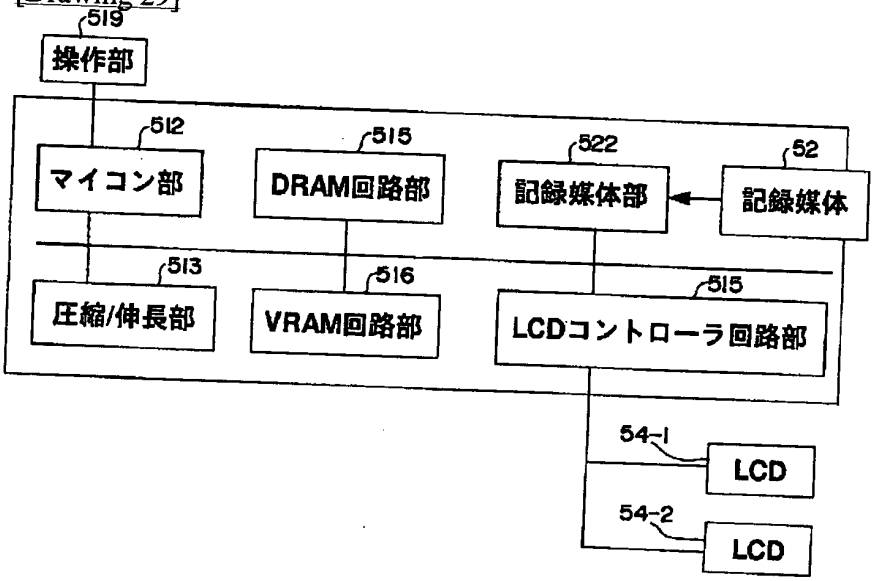
[Drawing 32]



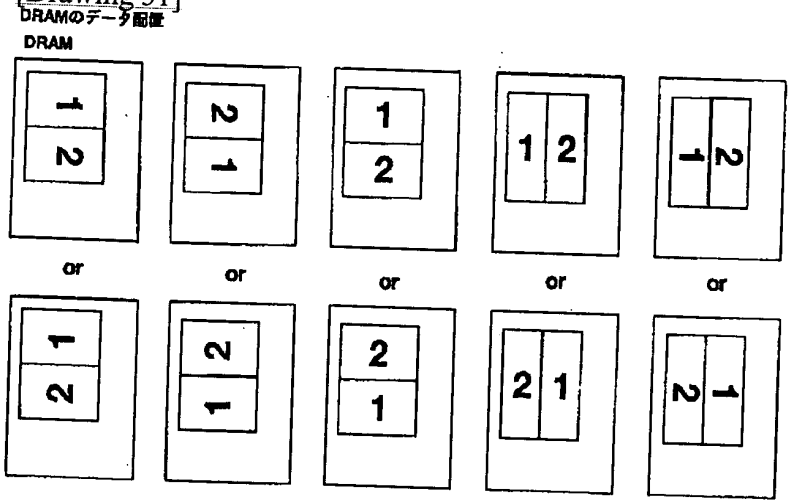
[Drawing 28]



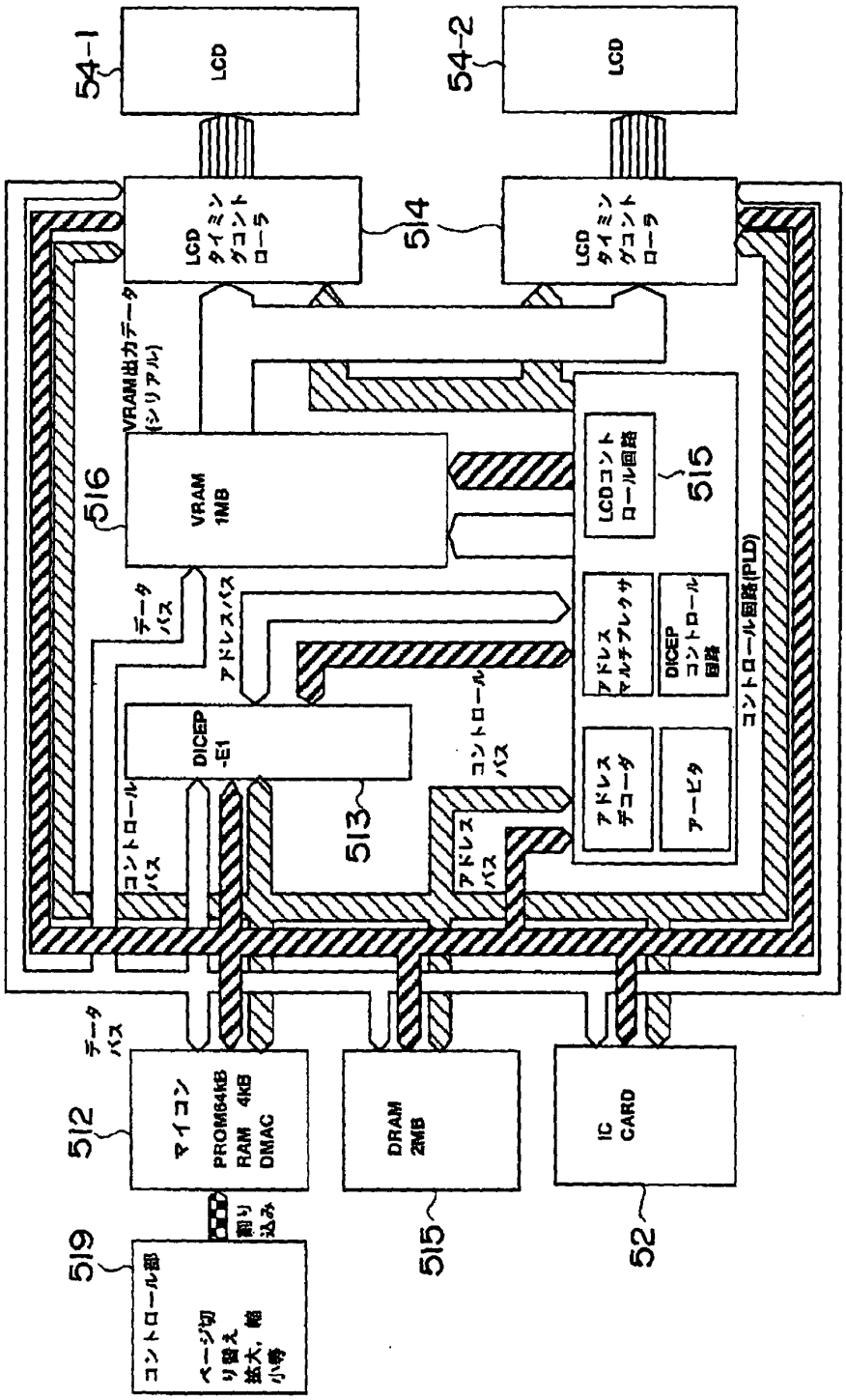
[Drawing 29]



[Drawing 31]



[Drawing 30]



[Translation done.]